

CRPL-F57

Reference Book  
National Bureau of Standards  
Washington, D.C.

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## IONOSPHERIC DATA

ISSUED  
MAY 1949

PREPARED BY CENTRAL RADIO PROPAGATION LABORATORY  
National Bureau of Standards  
Washington, D.C.



## IONOSPHERIC DATA

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## SYMBOLS AND TERMINOLOGY; CONVENTIONS FOR DETERMINING MEDIAN VALUES

Beginning with data reported for January 1949, the symbols, terminology, and conventions for the determination of median values used in this report (CRPL-F series) conform as far as practicable to those adopted at the Fifth Meeting of the International Radio Consultative Committee (C.C.I.R.) in Stockholm, 1948, and given in detail on pages 2 to 10 of the report CRPL-F53, "Ionospheric Data," issued January 1949.

For symbols and terminology used with data prior to January 1949, see report IRPL-C61, "Report of International Radio Propagation Conference, Washington, 17 April to 5 May, 1944," previous issues of the F series, in particular, IRPL-F5, CRPL-F24, F33, F50, and report CRPL-7-1, "Preliminary Instructions for Obtaining and Reducing Manual Ionospheric Records."

Following the recommendations of the Washington (1944) and Stockholm (1948) conferences, beginning with data for January 1945, median values are published wherever possible. Where averages are reported, they are, at any hour, the average for all the days during the month for which numerical data exist.

In addition to the conventions for the determination of medians given in Appendix 5 of Document No. 293 E of the Stockholm conference, which are listed on pages 9 and 10 of CRPL-F53, the following conventions are used in determining the medians for hours when no measured values are given because of equipment limitations and ionospheric irregularities. Symbols used are those given on pages 2-9 of CRPL-F53 (Appendices 1-4 of Document No. 293 E referred to above).

a. For all ionospheric characteristics:

Values missing because of A, B, C, F, L, M, N, Q, R, S, or T (see terminology referred to above) are omitted from the median count.

b. For critical frequencies and virtual heights:

Values of foF2 (and foE near sunrise and sunset) missing because of E are counted as equal to or less than the lower limit of the recorder. Values of h'F2 (and h'E near sunrise and sunset) missing for this reason are counted as equal to or greater than the median. Other characteristics missing because of E are omitted from the median count. See CRPL-F38, page 9.

Values missing because of D are counted as equal to or greater than the upper limit of the recorder.

Values missing because of G are counted:

1. For foF2, as equal to or less than foF1.
2. For h'F2, as equal to or greater than the median.

Values missing because of W are counted:

1. For foF2, as equal to or less than the median.
2. For h'F2, as equal to or greater than the median.

Values missing for any other reason are omitted from the median count.

c. For MUF factors (M-factors):

Values missing because of G or W are counted as equal to or less than the median.

Values missing for any other reason are omitted from the median count.

d. For sporadic E (Es):

Values of fEs missing because of G (no Es reflections observed, the equipment functioning normally otherwise) are counted as equal to or less than the median foE, or equal to or less than the lower frequency count of the recorder.

Values of fEs missing for any other reason, and values of h'Es missing for any reason at all are omitted from the median count.

Beginning with data for November 1945, doubtful monthly median values for ionospheric observations at Washington, D. C., are indicated by parentheses, in accordance with the practice already in use for doubtful hourly values. The following are the conventions used to determine whether or not a median value is doubtful:

1. If only four values or less are available, the data are considered insufficient and no median value is computed.

2. For the F2 layer, if only five to nine values are available, the median is considered doubtful. The E and F1 layers are so regular in their characteristics that, as long as there are at least five values, the median is not considered doubtful.

3. For all layers, if more than half of the values used to compute the median are doubtful (either doubtful or interpolated), the median is considered doubtful.

The same conventions are used by the CRPL in computing the medians from tabulations of daily and hourly data for stations other than Washington, beginning with the tables in IRPL-F1F.

## MONTHLY AVERAGE AND MEDIAN VALUES OF WORLD-WIDE IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 31 and figures 1 to 61 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL predictions of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

British Department of Scientific and Industrial Research,  
Radio Research Board:

Falkland Is.  
Fraserburgh, Scotland  
Lindau/Harz, Germany  
Slough, England

National Laboratory of Radio-Electricity (French Ionospheric Bureau):  
Bagnoux, France  
Poitiers, France

All India Radio (Government of India), New Delhi, India:  
Bombay, India  
Delhi, India  
Madras, India

Indian Council of Scientific and Industrial Research,  
Radio Research Committee:  
Calcutta, India

South African Council for Scientific and Industrial Research:  
Capetown, Union of S. Africa  
Johannesburg, Union of S. Africa

United States Army Signal Corps:  
Okinawa I.

National Bureau of Standards (Central Radio Propagation Laboratory):  
Baton Rouge, Louisiana (Louisiana State University)  
Boston, Massachusetts (Harvard University)  
Huancayo, Peru (Instituto Geofisico de Huancayo)  
Maui, Hawaii  
Palmyra I.  
San Francisco, California (Stanford University)  
San Juan, Puerto Rico (University of Puerto Rico)  
Trinidad, British West Indies  
Washington, D. C.  
White Sands, New Mexico  
Wuchang, China (National Wuhan University)

The tables and graphs of ionospheric data are correct for the values reported to the CRPL, but, because of variations in practice in the interpretation of records and scaling and manner of reporting of values, may at times give an erroneous conception of typical ionospheric characteristics at the station. Some of the errors are due to:

- a. Differences in scaling records when spread echoes are present.
- b. Omission of values when  $f_{oF2}$  is less than or equal to  $f_{oF1}$ , leading to erroneously high values of monthly averages or median values.
- c. Omission of values when critical frequencies are less than the lower frequency limit of the recorder, also leading to erroneously high values of monthly average or median values.

These effects were discussed on pages 6 and 7 of the previous F-series report IRPL-F5.

Ordinarily a blank space in the  $f_{Es}$  column of a table is the result of the fact that a majority of the readings for the month are below the lower limit of the recorder. Blank spaces at the beginning and end of columns of  $h'F1$ ,  $f_{oF1}$ ,  $h'E$ , and  $f_{oE}$  are usually the result of diurnal variation in these characteristics. Complete absence of medians of  $h'F1$  and  $f_{oF1}$  is usually the result of seasonal effects.

The dashed-line prediction curves of the graphs of ionospheric data are obtained from the predicted zero-muf contour charts of the CRPL-D series publications. The following points are worthy of note:

- a. Predictions for individual stations used to construct the charts may be more accurate than the values read from the charts since some smoothing of the contours is necessary to allow for the longitude effect within a zone. Thus, inasmuch as the predicted contours are for the center of each zone, part of the discrepancy between the predicted and observed values as given in the F series may be caused by the fact that the station is not centrally located within the zone.
- b. The final presentation of the predictions is dependent upon the latest available ionospheric and radio propagation data, as well as upon predicted sunspot number.
- c. There is no indication on the graphs of the relative reliability of the data; it is necessary to consult the tables for such information.

The following predicted smoothed 12-month running-average Zürich sunspot numbers were used in constructing the contour charts:

Month	Predicted Sunspot No.				
	1949	1948	1947	1946	1945
December		114	126	85	38
November		115	124	83	36
October		116	119	81	23
September		117	121	79	22
August		123	122	77	20
July		125	116	73	
June		129	112	67	
May		130	109	67	
April	109	133	107	62	
March	111	133	105	51	
February	113	133	90	46	
January	112	130	88	42	

### IONOSPHERIC DATA FOR EVERY DAY AND HOUR AT WASHINGTON, D. C.

The data given in tables 32 to 43 follow the scaling practices given in the report IRPL-061, "Report of International Radio Propagation Conference," pages 36 to 39, and the median values are determined by the conventions given above under "Symbols and Terminology; Conventions for Determining Median Values."

### IONOSPHERE DISTURBANCES

Table 44 presents ionosphere character figures for Washington, D. C., during April 1949, as determined by the criteria presented in the report IRPL-R5, "Criteria for Ionospheric Storminess," together with Cheltenham, Maryland, geomagnetic K-figures, which are usually covariant with them.

Table 45 lists for the stations whose locations are given the sudden ionosphere disturbances observed on the continuous field intensity recordings made at the Sterling Radio Propagation Laboratory during April 1949.

Table 46 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Brentwood and Somerton, England, receiving stations of Cable and Wireless, Ltd., for March and April, 1949.

Table 47 lists for the stations whose locations are given the sudden ionosphere disturbances reported by the Chinese Government Radio Administration as observed at Shanghai, China, during January, February, and March 1949.

Table 48 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Point Reyes, California, receiving station of RCA Communications, Inc., for April 6, 10, 11, and 28, 1949.

Table 49 gives provisional radio propagation quality figures for the North Atlantic and North Pacific areas, for 01 to 12 and 13 to 24 GCT, March 1949, compared with the CRPL daily radio disturbance warnings, which are primarily for the North Atlantic paths, the CRPL weekly radio propagation forecasts of probable disturbed periods, and the half-day Cheltenham, Maryland, geomagnetic K-figures.

The radio propagation quality figures are prepared from radio traffic and ionospheric data reported to the CRPL, in a manner basically the same as that described in IRPL-R31, "North Atlantic Radio Propagation Disturbances, October 1943 through October 1945," issued February 1, 1946. The scale conversions for each report are revised for use with the data beginning January 1948, and statistical weighting replaces what was, in effect, subjective weighting. Separate master distribution curves of the type described in IRPL-R31 were derived for the part of 1946 covered by each report; data received only since 1946 are compared with the master curve for the period of the available data. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. Each report is given a statistical weight which is the reciprocal of the departure from linearity. The half-daily radio propagation quality figure, beginning January 1948, is the weighted mean of the reports received for that period.

These radio propagation quality figures give a consensus of opinion of actual radio propagation conditions as reported by the half day over the two general areas. It should be borne in mind, however, that though the quality may be disturbed according to the CRPL scale, the cause of the disturbance is not necessarily known. There are many variables that must be considered. In addition to ionospheric storminess itself as the cause, conditions may be reported as disturbed because of seasonal characteristics such as are particularly evident in the pronounced day and night contrast over North Pacific paths during the winter months, or because of improper frequency usage for the path and time of day in question. Insofar as possible, frequency usage is included in rating the reports. Where the actual frequency is not shown in the report to the CRPL, it has been assumed that the report is made on the use of optimum working frequencies for the path and time of day in question. Since there is a possibility that all the disturbance shown by the quality figures is not due to ionospheric storminess alone, care should be taken in using the quality figures in research correlations with solar, auroral, geomagnetic, or other data. Nevertheless, these quality figures do reflect a consensus of opinion of actual radio propagation conditions as found on any one half day in either of the two general areas.

SOLAR CORONAL INTENSITIES OBSERVED  
AT CLIMAX, COLORADO

In tables 50a and 50b are listed the intensities of green (5303A) line of the emission spectrum of the solar corona as observed during April 1949 by the High Altitude Observatory of Harvard University and the University of Colorado at Climax, Colorado, for east and west limbs, respectively, at 5-degree intervals of position angle north and south of the solar equator at the limb. Beginning January 11, 1949, the actual measurements are on solar rotation coordinates rather than astronomical coordinates; thus values of the correction P given in previous coronal tables are omitted. The time of observation is given to the nearest tenth of a day, GCT. The tables of coronal observations in CRPL-F29 to F41 listed the data on astronomical coordinates; the present format on solar rotation coordinates is in conformity with the tables of CRPL-1-4, "Observations of the Solar Corona at Climax, 1944-46."

Tables 51a and 51b give similarly the intensities of the first red (6374A) coronal line; tables 52a and 52b list the intensities of the second red (6704A) coronal line. The following symbols are used in tables 50, 51, and 52: a, observation of low weight; -, corona not visible; and x, position angle not included in plate estimates.

AMERICAN AND ZÜRICH PROVISIONAL RELATIVE  
SUNSPOT NUMBERS

Table 53 presents the daily American relative sunspot number,  $R_A$ , computed from observations communicated to CRPL by observers in America and abroad. Beginning with the observations for January 1948, a new method of reduction of observations is employed such that each observer is assigned a scale-determining "observatory coefficient," ultimately referred to Zürich observations in a standard period, December 1944 to September 1945, and a statistical weight, the reciprocal of the variance of the observatory coefficient. The daily numbers listed in the table are the weighted means of all observations received for each day. Details of the procedure are given in the Publication of the Astronomical Society of the Pacific, issued February 1949, in an article entitled "Reduction of Sunspot-Number Observations." The American relative sunspot number computed in this way is designated  $R_A$ . It is noted that a number of observatories abroad, including the Zürich observatory, are included in  $R_A$ . The scale of  $R_A$  was referred specifically to that of the Zürich relative sunspot numbers in the standard comparison period; since that time,  $R_A$  is influenced by the Zürich observations only in that Zürich proves to be a consistent observer and receives a high statistical weight. In addition, this table lists the daily provisional Zürich sunspot numbers,  $R_Z$ .

# TABLES OF IONOSPHERIC DATA

Table 1

Washington, D. C. (39.0°N, 77.5°W)

April 1949

Time	$h^{\circ}F2$	$f^{\circ}F2$	$h^{\circ}F1$	$f^{\circ}F1$	$h^{\circ}E$	$f^{\circ}E$	$f_{BS}$	$F2-M3000$
00	280	7.1				2.6		
01	280	6.9				2.7		
02	280	6.6				2.6		
03	270	6.3				2.6		
04	270	5.7				2.7		
05	280	5.6				2.7		
06	260	6.7	120	2.0		3.0		
07	240	8.3			100	2.6	3.6	3.0
08	230	9.2	220	---	100	3.1	3.7	3.0
09	250	9.6	220	4.7	100	3.4	3.8	2.9
10	255	10.2	200	5.6	100	3.6	3.7	2.8
11	280	10.6	200	5.2	100	3.7	3.4	2.8
12	325	10.6	210	6.0	100	3.8	3.6	2.8
13	290	10.6	220	5.6	100	3.9	2.7	
14	270	10.6	215	5.8	100	3.8	3.2	2.8
15	230	10.5	230	---	100	3.6	2.7	
16	230	10.3	225	---	100	3.3	2.8	
17	240	10.0	---	---	100	2.9	2.8	
18	250	(9.7)			110	2.2	2.0	(2.9)
19	245	(9.4)				1.9		(2.9)
20	245	8.6				2.8		
21	250	8.0				2.7		
22	270	7.8				2.7		
23	280	7.4				2.6		

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 15 seconds.

Table 2

Boston, Massachusetts (42.4°N, 71.2°W)

March 1949

Time	$h^{\circ}F2$	$f^{\circ}F2$	$h^{\circ}F1$	$f^{\circ}F1$	$h^{\circ}E$	$f^{\circ}E$	$f_{BS}$	$F2-M3000$
00	275	6.9						2.6
01	265	6.6						2.6
02	268	5.6						2.6
03	260	5.4						2.6
04	255	5.2					---	2.6
05	265	5.0					135	1.8
06	250	6.7					140	2.0
07	248	9.0	---	---	---	140	2.2	3.0
08	255	10.8	---	---	---	---	---	3.0
09	250	10.0	---	---	---	---	---	3.0
10	260	10.4	---	---	---	---	---	3.0
11	285	11.1	---	---	---	---	---	2.9
12	308	10.8	---	---	---	---	---	3.0
13	318	10.8	---	---	---	---	---	2.9
14	282	10.8	---	---	---	---	---	2.9
15	265	10.8	---	---	---	---	---	2.9
16	250	10.7				145	3.0	2.9
17	250	10.2				150	2.2	2.9
18	240	10.3				---	---	2.9
19	245	9.8				---	---	2.8
20	250	9.0				---	---	2.8
21	255	8.4				---	---	2.7
22	265	7.6				---	---	2.7
23	265	7.4				---	---	2.7

Time: 75.0°W.

Sweep: 0.8 Mc to 14.0 Mc in 1 minute.

Table 3

San Francisco, California (37.4°N, 122.2°W)

March 1949

Time	$h^{\circ}F2$	$f^{\circ}F2$	$h^{\circ}F1$	$f^{\circ}F1$	$h^{\circ}E$	$f^{\circ}E$	$f_{BS}$	$F2-M3000$
00	260	6.0				2.4		
01	280	5.9				2.4		
02	300	5.8				2.4		
03	280	5.4				2.4		
04	280	5.5				2.4		
05	300	5.4				2.4		
06	270	6.0				2.5		
07	240	8.1	120	2.4		2.9		
08	230	10.0			120	3.1	2.9	
09	220	10.8	---	---	110	3.4	2.8	
10	220	12.0	220	---	110	3.6	2.7	
11	220	12.6	210	---	110	3.8	2.7	
12	220	13.2	210	---	110	3.9	2.6	
13	220	13.0	215	---	110	3.9	2.6	
14	220	13.2	215	---	110	3.8	2.6	
15	220	12.6	---	---	110	3.6	2.6	
16	240	12.5			120	3.3	2.6	
17	240	12.2			120	2.7	2.7	
18	235	11.5			130	2.2	2.7	
19	220	10.0				2.8		
20	220	8.6				2.8		
21	240	7.3				2.7		
22	240	6.6				2.6		
23	260	6.3				2.6		

Time: 120.0°W.

Sweep: 1.3 Mc to 18.0 Mc in 4 minutes 30 seconds.

Table 4

White Sands, New Mexico (32.3°N, 106.5°W)

March 1949

Time	$h^{\circ}F2$	$f^{\circ}F2$	$h^{\circ}F1$	$f^{\circ}F1$	$h^{\circ}E$	$f^{\circ}E$	$f_{BS}$	$F2-M3000$
00	280	6.6					---	2.6
01	280	6.6					---	2.6
02	280	6.4					---	2.6
03	260	6.1					---	2.5
04	280	5.6					---	2.5
05	290	5.5					---	2.5
06	280	6.0					2.3	2.6
07	240	(9.2)					120	2.4
08	240	11.1					110	3.0
09	230	12.1					110	3.4
10	230	12.6	---	---			110	3.7
11	220	13.2	---	---			110	3.8
12	230	13.4	---	---			110	3.9
13	220	13.4	---	---			110	4.0
14	230	13.3	---	---			110	3.9
15	230	13.2					110	3.7
16	240	12.9					110	3.3
17	240	12.3					120	2.7
18	240	11.9					120	1.8
19	230	10.6					---	2.4
20	230	9.2					---	2.3
21	250	(7.8)					---	2.3
22	260	7.1					---	2.8
23	280	6.9					---	2.6

Time: 106.0°W.

Sweep: 0.8 Mc to 14.0 Mc in 2 minutes.

Table 5

Wing, China (30.6°N, 114.4°E)

March 1949

Time	$h^{\circ}F2$	$r^{\circ}F2$	$h^{\circ}F1$	$r^{\circ}F1$	$h^{\circ}E$	$r^{\circ}E$	$f^{\circ}Es$	F2-M3000
00	250	10.4				3.9		
01	240	10.2				3.0		
02	230	9.1				3.0		
03	225	7.5				3.0		
04	220	5.4				2.8		
05	250	5.8				2.7		
06	260	6.0				2.7		
07	240	8.5			115	2.0	3.1	
08	225	11.4	---	---	100	2.8	3.2	
09	220	15.0	---	---	100	3.3	3.1	
10	22	13.1	210	---	100	3.6	3.0	
11	235	14.2	216	6.3	100	3.8	4.1	
12	240	14.8	210	5.7	100	3.9	2.9	
13	240	15.4	200	5.5	100	3.9	2.8	
14	290	15.0	220	7.2	100	3.8	2.8	
15	300	15.0	220	7.1	100	3.6	2.8	
16	238	14.8	215	6.5	100	3.3	2.8	
17	230	14.5	---	---	100	3.0	2.8	
18	232	14.0	---	---	100	2.2	2.9	
19	235	13.4				2.2	2.9	
20	240	12.4					2.9	
21	235	12.0				2.0	2.9	
22	240	12.0					2.9	
23	242	11.4					2.9	

Time: 120.0°E.

Sweep: 1.2 Mc to 19.0 Mc in 15 minutes, manual operation.

Table 6

Baton Rouge, Louisiana (30.5°N, 91.2°W)

March 1949

Time	$h^{\circ}F2$	$r^{\circ}F2$	$h^{\circ}F1$	$r^{\circ}F1$	$h^{\circ}E$	$r^{\circ}E$	$f^{\circ}Es$	F2-M3000
00	290	7.0						2.8
01	290	7.0						2.8
02	290	5.8						2.8
03	290	6.4						2.8
04	290	6.1						2.8
05	295	5.7						2.7
06	290	6.4						2.8
07	280	9.4	---	---	160		2.5	3.1
08	280	11.4	230	---	120	3.0		3.0
09	290	12.1	230	---	120	3.5		3.0
10	300	13.2	225	---	120	3.6		2.9
11	310	13.3	220	---	120	3.7		2.8
12	310	13.3	225	---	120	3.8		2.8
13	320	13.5	230	---	120	3.8		2.8
14	320	13.1	230	---	120	3.7		2.8
15	320	13.1	230	---	120	3.6		2.8
16	320	12.6	245	---	120	3.4		2.8
17	300	12.2	250	---	125	2.8		2.8
18	260	11.9						2.9
19	240	10.0						2.9
20	260	8.6						2.9
21	280	8.0						2.9
22	280	7.7						2.9
23	290	7.5						2.8

Time: 90.0°W.

Sweep: 2.12 Mc to 15.3 Mc in 8 minutes 30 seconds, automatic operation.

Table 7

Okinawa I. (26.3°N, 127.7°E)

March 1949

Time	$h^{\circ}F2$	$r^{\circ}F2$	$h^{\circ}F1$	$r^{\circ}F1$	$h^{\circ}E$	$r^{\circ}E$	$f^{\circ}Es$	F2-M3000
00		13.1				3.0		
01		12.8				3.0		
02		11.3				3.1		
03		8.6				3.1		
04		6.8				2.8		
05		6.1				2.7		
06		6.2				2.8		
07		8.1				3.0		
08		11.6				3.1		
09		13.1				3.1		
10		14.1				4.0		
11		14.4				4.2		
12		15.1				4.4		
13		15.8				4.6		
14		16.6				4.6		
15		16.7				4.4		
16		16.4				4.4		
17		15.6				4.2		
18		14.8				3.6		
19		15.0				2.8		
20		16.6				2.8		
21		(16.3)				2.9		
22		15.0				2.9		
23		14.3				2.9		

Time: 135.0°E.

Sweep: 3.2 Mc to 18.0 Mc in 15 minutes, manual operation.

Table 8

Maui, Hawaii (20.8°N, 156.5°W)

March 1949

Time	$h^{\circ}F2$	$r^{\circ}F2$	$h^{\circ}F1$	$r^{\circ}F1$	$h^{\circ}E$	$r^{\circ}E$	$f^{\circ}Es$	F2-M3000
00	250	10.0						3.0
01	240	8.6						3.1
02	240	7.4						3.0
03	240	5.6						3.0
04	265	4.4						2.8
05	315	4.1						2.6
06	325	4.1						2.7
07	250	7.9						3.0
08	250	10.8	225	---	110	3.0		
09	250	12.4	230	---	100	3.4		
10	260	13.6	220	6.1	105	3.8		
11	280	14.7	220	---	110	4.0		
12	300	15.2	230	---	110	4.0		
13	320	15.8	230	7.0	100	3.8		
14	330	15.8	220	6.7	100	3.9		
15	310	15.7	230	(6.6)	100	3.6		
16	300	15.4	230	6.5	100	3.4		
17	260	14.6	235	---	100	3.1		
18	240	14.1				120	2.4	3.3
19	245	13.8						2.8
20	250	13.8						3.0
21	250	12.8						(2.9)
22	240	12.1						(2.9)
23	240	11.4						3.0

Time: 150.0°W.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute; above 16.0 Mc, manual operat.

Table 9

San Juan, Puerto Rico ( $18.4^{\circ}\text{N}$ ,  $66.1^{\circ}\text{W}$ )

March 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_\text{s}$	F2-M3000
00		10.5				2.8		
01		10.0				2.8		
02		8.6				2.9		
03		7.1				2.8		
04		6.0				2.7		
05		5.7				2.7		
06		5.9				2.7		
07	250	8.8	3.3			3.0		
08	250	11.1	3.8	3.0		2.9		
09	250	12.8			5.5	2.8		
10	280	13.5			3.8	2.7		
11	285	12.5			4.0	2.6		
12	300	13.5			4.1	2.6		
13	320	(13.4)			4.1	2.6		
14	340	13.5	8.1	4.0		2.5		
15	330	13.0	6.0	5.8		2.5		
16	320	13.0	(5.5)	3.5	4.6	2.5		
17	290	12.8	(4.0)	3.2		2.5		
18	270	12.5	3.2			2.6		
19	260	12.0				2.6		
20	11.0					2.6		
21	10.6					2.6		
22	10.6					2.6		
23	10.6					2.6		

Time:  $60.0^{\circ}\text{W}$ .

Sweep: 2.8 Mc to 13.0 Mc in 9 minutes, supplemented by manual operation.

Table 11

Palmyra I. ( $5.9^{\circ}\text{N}$ ,  $162.1^{\circ}\text{W}$ )

March 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_\text{s}$	F2-M3000
00	250	13.7				3.8	2.9	
01	240	(11.4)				3.8	(2.9)	
02	250	(10.4)				3.8	(2.7)	
03	250	(9.0)				3.5	(2.8)	
04	260	(8.6)				3.7	(2.9)	
05	250	8.4				3.7	(2.8)	
06	250	7.8				3.5	2.8	
07	280	9.8			140	—	3.6	2.7
08	250	12.1			130	3.2	4.3	2.6
09	250	13.4	240	—	130	3.7	4.4	2.4
10	270	13.5	240	—	120	3.9	4.2	2.3
11	280	13.1	240	—	120	—	2.2	
12	270	13.0	(230)	—	120	—	2.2	
13	280	13.3	240	—	120	—	2.2	
14	270	13.9	230	—	120	—	2.2	
15	270	14.3	230	—	120	3.9	4.0	2.2
16	250	14.8	210	3.8	120	3.6	3.8	2.3
17	260	15.2			130	3.1	4.0	2.3
18	290	15.0			140	2.2	3.9	2.3
19	340	14.6				3.0	2.2	
20	390	13.8				1.9	2.1	
21	340	14.3				2.5	(2.3)	
22	290	14.8				3.7	(2.5)	
23	250	14.3				3.8	2.8	

Time:  $157.5^{\circ}\text{W}$ .

Sweep: 1.0 Mc to 13.0 Mc in 1 minute 36 seconds, automatic operation; 13.0 Mc to 18.0 Mc, manual operation.

Table 10

Trinidad, Brit. West Indies ( $10.6^{\circ}\text{N}$ ,  $61.2^{\circ}\text{W}$ )

March 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_\text{s}$	F2-M3000
00		260			11.8			
01		240			10.4			
02		230			8.5			
03		240			6.8			
04		250			5.8			
05		270			5.0			
06		270			6.1			
07		250			9.3			
08		240			11.4	—	—	
09		250			12.9	230	4.7	
10		260			13.8	220	5.1	
11		250			13.8	220	5.2	
12		260			13.8	230	5.3	
13		260			14.0	220	5.2	
14		270			14.	225	5.2	
15		270			13.8	230	5.1	
16		270			13.4	240	5.0	
17		260			13.2	250	(4.7)	
18		270			13.1			
19		280			12.8			
20		280			12.6			
21		270			12.4			
22		280			12.0			
23		280			12.5			

Time:  $60.0^{\circ}\text{W}$ .

Sweep: 1.2 Mc to 18.0 Mc, manual operation.

Table 12

Huancayo, Peru ( $12.0^{\circ}\text{S}$ ,  $75.3^{\circ}\text{W}$ )

March 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_\text{s}$	F2-M3000
00		230			9.6			
01		230			9.7			
02		240			8.6			
03		240			7.9			
04		230			6.9			
05		240			5.9			
06		270			6.4			
07		250			10.5			
08		240			13.0			
09		—			14.2	230	—	
10		270			14.0	220	5.5	
11		260			14.2	210	5.4	
12		260			14.0	210	5.5	
13		270			13.0	210	5.5	
14		270			12.8	210	5.4	
15		—			13.0	210	—	
16		235			13.0			
17		260			12.9			
18		310			12.0			
19		420			11.2			
20		410			10.4			
21		330			10.2			
22		290			11.0			
23		245			10.0			

Time:  $75.0^{\circ}\text{W}$ .

Sweep: 16.0 Mc to 0.5 Mc in 15 minutes, automatic operation.

Table 13

Lindau/Harz, Germany ( $51.6^{\circ}\text{N}$ ,  $10.1^{\circ}\text{E}$ )

February 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{f}^{\circ}\text{Es}$	$\text{F2-M3000}$
00	300	4.8						
01	300	4.7						
02	305	4.4						
03	305	4.1						
04	305	3.8						
05	300	3.3						
06	300	3.3						
07	290	4.3						
08	220	7.8	130	2.0	2.0			
09	215	10.1	105	2.6	2.7			
10	215	11.3	105	2.9	3.3			
11	210	12.5	105	3.2	3.2			
12	215	12.4	105	3.2	3.2			
13	220	12.7	105	3.2	3.2			
14	215	12.0	105	3.2	3.3			
15	220	12.0	105	3.0	3.2			
16	220	12.0	105	2.6	2.6			
17	220	11.3	110	2.0	2.4			
18	215	10.3			2.5			
19	210	8.5			2.0			
20	215	7.1			2.0			
21	250	6.2						
22	290	5.7						
23	300	5.5						

Time:  $15.0^{\circ}\text{E}$ .

Sweep: 1.4 Mc to 16.0 Mc in 7 minutes.

Table 14

Johannesburg, Union of S. Africa ( $26.2^{\circ}\text{S}$ ,  $28.0^{\circ}\text{E}$ )

February 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{f}^{\circ}\text{Es}$	$\text{F2-M3000}$
00	270	7.0						
01	270	6.5						
02	260	6.0						
03	260	5.3						
04	260	5.0						
05	280	4.7						
06	260	6.1						
07	240	8.4	240	---	110	1.9		
08	260	9.9	230	4.9	110	3.4	3.3	3.0
09	300	10.7	220	---	110	3.8	4.1	2.7
10	320	11.4	210	6.0	110	4.0	4.3	2.7
11	330	11.7	210	6.0	110	(4.1)		2.8
12	350	12.0	210	6.4	110	(4.1)	4.2	2.6
13	350	12.2	210	6.0	110	---		2.6
14	360	12.1	220	6.2	100	(4.1)		2.8
15	350	12.0	220	5.9	110	(4.0)		2.6
16	330	11.7	220	---	110	3.7		2.7
17	300	11.3	230	---	110	3.3	3.9	2.7
18	260	10.9	240	---	100	2.6	3.5	2.8
19	250	10.5	---	---	---	---	3.0	2.8
20	250	9.5	---	---	---	---	1.8	2.8
21	250	9.0	---	---	---	---	2.3	2.8
22	250	8.2	---	---	---	---	1.9	2.8
23	260	7.5	---	---	---	---	---	2.6

Time:  $30.0^{\circ}\text{E}$ .

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 15

Capetown, Union of S. Africa ( $34.2^{\circ}\text{S}$ ,  $18.3^{\circ}\text{E}$ )

February 1949

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{f}^{\circ}\text{Es}$	$\text{F2-M3000}$
00	(280)	5.8				2.8		
01	(290)	5.2			1.9	2.7		
02	(290)	5.0				2.7		
03	(295)	4.8				2.7		
04	(290)	4.8				2.7		
05	(310)	4.3				2.6		
06	300	4.8				2.7		
07	250	7.0	---	---	120	2.3	3.0	
08	(280)	8.8	240	---	110	3.0	3.1	2.9
09	(280)	10.1	230	---	110	3.5	3.6	2.8
10	(300)	11.0	230	---	110	---	2.7	
11	330	11.2	---	6.0	110	---	2.8	
12	350	11.5	---	---	110	---	2.6	
13	350	12.0	---	---	110	---	2.6	
14	360	12.0	---	(8.5)	110	---	2.6	
15	365	11.6	---	6.2	110	---	2.8	
16	350	11.1	---	6.0	110	---	2.6	
17	330	10.7	230	---	110	3.5	2.7	
18	(305)	10.2	240	---	110	3.0	2.7	
19	250	10.0	---	---	110	2.2	2.8	
20	250	9.5			100	---	2.8	
21	240	8.3				2.8		
22	(240)	7.4			1.7	2.9		
23	(250)	6.4				2.9		

Time:  $30.0^{\circ}\text{E}$ .

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 16

Delhi, India ( $28.6^{\circ}\text{N}$ ,  $77.1^{\circ}\text{E}$ )

January 1949

Time	*	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{f}^{\circ}\text{Es}$	$\text{F2-M3000}$	*
00	480	4.6							2.4
01	480	4.3							
02	(500)	(4.4)							
03	---	---							
04	(460)	3.6							
05	470	2.9							
06	440	3.5							
07	380	7.2							
08	360	10.0							
09	360	11.4							
10	400	11.9							
11	400	13.0							
12	440	12.3							
13	440	13.2							
14	460	13.0							
15	440	13.2							
16	440	13.2							
17	400	13.0							
18	400	11.6							
19	400	10.6							
20	390	9.4							
21	400	8.1							
22	440	6.2							
23	460	5.0							

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83  $\text{f}^{\circ}\text{F2}$ .

\*\*Average values; other columns, median values.

Table 17

Bombay, India ( $19.0^{\circ}\text{N}$ ,  $73.0^{\circ}\text{E}$ )

January 1949

Time	*	$f^{\circ}\text{F2}$	$h^{\circ}\text{Fl}$	$f^{\circ}\text{Fl}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M}3000$	**
00									
01									
02									
03									
04									
05									
06									
07									
08	360	11.9						2.9	
09	420	12.9							
10	480	13.8							
11	---	(14.1)							
12	---	(14.3)						2.7	
13	---	(14.4)							
14	---	(14.7)							
15	---	14.9							
16	---	(15.0)							
17	---	(15.1)							
18	---	(15.1)							
19	480	(14.9)							
20	480	14.6						2.7	
21	450	14.2							
22	420	13.6						2.8	
23	(420)	(12.6)							

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83  $f^{\circ}\text{F2}$ .

\*\*Average values; other columns, median values.

Table 18

Madras, India ( $13.0^{\circ}\text{N}$ ,  $80.2^{\circ}\text{E}$ )

January 1949

Time	*	$f^{\circ}\text{F2}$	$h^{\circ}\text{Fl}$	$f^{\circ}\text{Fl}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M}3000$	**
00									
01									
02									
03									
04									
05									
06									
07	360	9.4							
08	420	10.4							2.9
09	480	11.0							
10	480	11.8							
11	480	12.0							
12	525	12.4							
13	540	12.6							2.5
14	540	12.6							
15	540	12.2							
16	540	12.2							
17	540	12.0							
18	480	11.4							
19	480	(11.2)							
20	(540)	(10.4)							
21	---	(10.0)							
22	---	(10.0)							
23									

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83  $f^{\circ}\text{F2}$ .

\*\*Average values; other columns, median values.

Table 19

Delhi, India ( $28.6^{\circ}\text{N}$ ,  $77.1^{\circ}\text{E}$ )

December 1948

Time	*	$f^{\circ}\text{F2}$	$h^{\circ}\text{Fl}$	$f^{\circ}\text{Fl}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M}3000$	**
00	480	4.3						2.3	
01	260	4.3							
02	480	3.7							
03									
04	470	3.6							
05	(420)	(3.7)							
06	440	4.2							
07	360	7.8							
08	380	10.8							
09	380	11.9						2.8	
10	400	13.0							
11	400	13.3							
12	400	(13.4)							
13	430	(13.5)							
14	420	(13.2)							
15	400	(13.4)							
16	400	(13.2)							
17	400	12.6							
18	(380)	11.1							
19	(440)	(9.4)							
20	400	8.6							
21	400	7.2						2.7	
22	400	5.4							
23	400	4.7							

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83  $f^{\circ}\text{F2}$ .

\*\*Average values; other columns, median values.

Table 20

Bombay, India ( $19.0^{\circ}\text{N}$ ,  $73.0^{\circ}\text{E}$ )

December 1948

Time	*	$f^{\circ}\text{F2}$	$h^{\circ}\text{Fl}$	$f^{\circ}\text{Fl}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M}3000$	**
00									
01									
02									
03									
04									
05									
06									
07	330	8.3							
08	360	10.9							2.8
09	420	12.2							
10	480	13.3							
11		(13.8)							
12		(14.0)							
13		(14.3)							
14		(14.4)							
15		(14.6)							
16		(14.8)							
17		(15.0)							
18		(16.0)							
19		(14.9)							
20	480	(14.9)							
21	480	14.3							
22	480	13.6							2.7
23									

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83  $f^{\circ}\text{F2}$ .

\*\*Average values; other columns, median values.

Table 21

Madras, India ( $13.0^{\circ}\text{N}$ ,  $80.2^{\circ}\text{E}$ )

December 1948

Time	*	$f^{\circ}\text{F2}$	$h^{\circ}\text{F1}$	$f^{\circ}\text{F1}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M3000}$
00								
01								
02								
03								
04								
05								
06								
07	360	8.0						
08	420	9.6						
09	480	10.4						
10	480	10.8						
11	480	11.0						
12	510	11.1						
13	540	11.4						
14	540	11.5						
15	540	11.5						
16	540	11.8						
17	540	11.9						
18	540	11.9						
19	540	11.6						
20	525	11.0						
21	480	(10.6)						
22	480	10.4						
23								

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83  $f^{\circ}\text{F2}$ .

\*\*Average values; other columns, median values.

Table 22

Pagnieux, France ( $48.8^{\circ}\text{N}$ ,  $2.3^{\circ}\text{E}$ )

October 1948

Time	$h^{\circ}\text{F2}$	$f^{\circ}\text{F2}$	$h^{\circ}\text{F1}$	$f^{\circ}\text{F1}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M3000}$
00								
01								
02								
03								
04								
05								
06		300						
07	295							
08	290							
09								
10								
11								
12								
13								
14								
15								
16								
17								
18	280							
19	280							
20	315							
21	340							
22	380							
23								

Time: 0.0°.

Sweep: 3.9 Mc to 13.4 Mc in 12 minutes, manual operation.

Table 23

Poitiers, France ( $46.6^{\circ}\text{N}$ ,  $2.0^{\circ}\text{W}$ )

October 1948

Time	$h^{\circ}\text{F2}$	$f^{\circ}\text{F2}$	$h^{\circ}\text{F1}$	$f^{\circ}\text{F1}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M3000}$
00								
01								
02	330	4.3						
03	328	4.6						
04	305	4.2						
05	280	3.8						
06	278	4.4	E					
07	250	7.3	E					
08	250	9.4	230					
09	250	10.5	230	110	3.2	3.8	3.1	
10	240	(11.4)	222	120	3.2	4.3	(3.1)	
11	250	>11.8	220	110	3.4	3.8	(3.1)	
12	250	>11.8	220	110	3.4	3.7		
13	250	>11.8	225	110	3.4			
14	255	>11.8	230	125	3.3			
15	250	>11.8	230		3.1			
16	250	>11.8	230	E				
17	240	11.2	232	E		(3.2)		
18	230	9.6				3.2		
19	235	7.4				3.0		
20	252	6.1				2.9		
21	280	5.1				2.8		
22	308	5.2				2.6		
23		4.8					(2.5)	

Time: 0.0°.

Sweep: 3.1 Mc to 11.8 Mc in 6 minutes (October 1 through 19);  
in 1 minute 15 seconds (October 20 through 31); automatic operation.

Table 24

Calcutta, India ( $22.6^{\circ}\text{N}$ ,  $88.4^{\circ}\text{E}$ )

October 1948

Time	$h^{\circ}\text{F2}$	$f^{\circ}\text{F2}$	$h^{\circ}\text{F1}$	$f^{\circ}\text{F1}$	$h^{\circ}\text{E}$	$f^{\circ}\text{E}$	$f^{\circ}\text{Es}$	$F2-\text{M3000}$
00	(300)	(10.7)						2.3
01		(8.8)						2.2
02		(8.0)						2.2
03								1.8
04								1.8
05								
06	(300)	(7.2)						2.2
07		(7.8)						2.6
08		(9.8)						3.2
09	(360)	(10.7)						3.6
10		(11.2)						4.0
11		11.2						4.0
12	(390)	11.1						4.0
13		12.2						(2.6)
14		12.7						
15	(360)	12.2						4.0
16		12.0						4.0
17		12.6						3.7
18	(390)	(12.6)						3.6
19		(12.6)						(2.4)
20		(12.4)						3.4
21	(330)	(12.4)						3.6
22		(11.2)						2.8
23		(11.0)						(2.7)

Time: Local.

\*Probably includes  $f^{\circ}\text{Es}$  observations.

Table 25\*

Fraserburgh, Scotland ( $57.6^{\circ}\text{N}$ ,  $2.1^{\circ}\text{W}$ )

September 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fEs}$	$\text{F2-M3000}$
00	3.0							
01	3.0							
02	3.0							
03	3.5							
04	2.5							
05	3.0							
06	3.0							
07	2.7	5.4						
08	2.8	5.4	250	3.8	120	2.6	3.0	
09	2.8	5.4	245	4.3	125	3.0	3.0	
10	2.6	7.5	225	4.6	120	3.2	2.8	
11	2.8	7.5	230	4.7	125	3.5	2.8	
12	2.8	7.9	215	5.0	120	3.6	2.8	
13	2.5	7.5	225	4.9	120	3.7	2.7	
14	2.5	8.5	230	4.8	120	3.6	2.8	
15	2.5	8.7	255	4.7	120	3.4	2.7	
16	2.5	9.2	235	4.4	120	3.1	2.7	
17	2.6	9.0	250	4.0	125	2.7	2.9	
18	2.6	(9.0)			110	2.8	3.0	
19	2.5	(8.3)					2.9	
20	2.5	8.1					3.4	
21	2.5	(7.0)					2.8	
22	2.5	(5.2)					3.2	
23	3.0	4.8					3.6	

Time: Local.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute.

\*Average values except for  $\text{f}^{\circ}\text{F2}$ , which are median values.

#One or two observations only.

Table 26\*

Slough, England ( $51.5^{\circ}\text{N}$ ,  $0.6^{\circ}\text{W}$ )

September 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fEs}$	$\text{F2-M3000}$
00	-	-	-	-	5.8			3.2
01	-	-	-	-	4.5			3.1
02	-	-	-	-	4.8			2.5
03	-	-	-	-	4.6			2.6
04	-	-	-	-	4.4			2.5
05	-	-	-	-	4.2			3.0
06	-	-	-	-	4.2			2.6
07	276	5.5	279	3.6	127	1.8	3.7	2.9
08	273	6.9	246	4.3	119	2.5	4.6	3.0
09	280	7.6	234	4.5	118	2.9	4.8	3.0
10	294	8.9	235	5.1	114	3.2		2.9
11	303	8.5	234	5.2	113	3.4	4.8	2.9
12	305	9.0	233	5.2	112	3.5	4.9	2.8
13	302	9.0	233	5.2	113	3.5	4.3	2.8
14	295	9.1	236	5.1	110	3.4	4.9	2.8
15	299	9.3	237	5.0	111	3.3	4.8	2.8
16	268	9.4	237	4.7	114	3.0	4.8	2.8
17	258	9.2	257	4.7	117	2.4	4.2	2.9
18	250	9.5			137	2.0	3.6	2.9
19	243	9.1					3.4	2.9
20	246	8.3					3.4	2.8
21	251	7.0					3.2	2.7
22	277	6.3					3.4	2.6
23	296	5.9					3.3	2.6

Time: Local.

Sweep: 0.5 Mc to 16.5 Mc in 5 minutes.

\*Average values except for  $\text{f}^{\circ}\text{F2}$  and  $\text{fEs}$ , which are median values.

#One or two observations only.

Table 27

Bagnoux, France ( $48.8^{\circ}\text{N}$ ,  $2.3^{\circ}\text{E}$ )

September 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fEs}$	$\text{F2-M3000}$
00								
01								
02								
03								
04								
05								
06	290							
07	280	240						
08	255							
09	320	250						
10	220							
11	320	240						
12	230							
13	240							
14	240							
15	250							
16	260							
17	260							
18	250							
19	280	270						
20	280	280						
21	285							
22	310							
23								

Time: 0.0°.

Sweep: 3.9 Mc to 13.4 Mc in 12 minutes, manual operation.

Table 28

Poitiers, France ( $46.6^{\circ}\text{N}$ ,  $2.0^{\circ}\text{W}$ )

September 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fEs}$	$\text{F2-M3000}$
00								
01								
02								
03	330	5.3						2.7
04	320	5.0						2.6
05	300	4.8						2.8
06	280	6.0						3.0
07	250	7.4	232				4.6	3.0
08	255	8.0	220		112	3.3	4.8	3.2
09	260	9.1	220		120	3.3	4.2	3.1
10	255	9.4	220		118	3.4	4.6	3.0
11	260	9.1	210	4.8	115	3.6	4.6	3.1
12	280	9.4	210	4.9	120	3.6	4.7	3.0
13	270	9.4	220		110	3.6	4.7	3.0
14	220	9.0	230		115	3.4	4.8	3.0
15	280	10.0	230		120	3.3	4.4	2.9
16	280	10.0	235		130	3.2	4.5	3.0
17	260	10.0	245				4.2	3.0
18	250	9.4					3.8	3.0
19	240	9.0					5.0	3.0
20	255	8.0					4.1	2.9
21	265	7.3					4.9	2.8
22	300	6.5					(5.0)	2.8
23								

Time: 0.0°.

Sweep: 3.1 Mc to 11.8 Mc in 6 minutes, automatic operation.

Table 29

Calcutta, India ( $22.6^{\circ}\text{N}$ ,  $88.4^{\circ}\text{E}$ )

September 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_s$	F2-M3000
00	315	10.6			2.4		2.8	
01		9.9			2.4			
02		9.1			2.0			
03	(3.1)	(6.8)			1.8		(2.8)	
04		6.9			1.9			
05		7.4			2.0			
06	(1.8)	7.8			2.2		(2.7)	
07		9.7			2.5			
08		10.2			3.0			
09	(3.6)	10.8			3.4		(2.6)	
10		11.0			3.4			
11		11.0			3.6			
12	360	11.0			4.0		2.7	
13		11.0			4.4			
14		11.5			4.2			
15	360	11.6			4.2		2.7	
16		11.3			4.3			
17		11.0			3.8			
18	375	11.2			3.8		2.6	
19		11.0			3.6			
20		11.0			3.4			
21	(3.30)	10.8			3.0		2.8	
22		11.0			2.8			
23		10.8			2.6			

Time: Local.

\*Probably includes fE<sub>s</sub> observations.

Table 30

Poitiers, France ( $46.6^{\circ}\text{N}$ ,  $2.0^{\circ}\text{W}$ )

August 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_s$	F2-M3000
00			330		6.6			2.6
01			01					
02			(325)		5.8			2.6
03			(350)		5.4			(2.6)
04			325		5.4			2.8
05			290		5.4			
06			262		6.5	250		(3.0)
07			260		7.4	230		(2.9)
08			288		7.7	230		(3.0)
09			290		8.3	220		3.0
10			340		8.5	220		(2.8)
11			330		8.4	220		2.8
12			345		8.6	210	5.6	(2.7)
13			360		8.3	220	5.4	2.7
14			330		8.4	220	5.4	2.8
15			320		8.6	225	4.9	2.8
16			315		8.1	230		2.9
17			300		8.5	242		2.9
18			280		8.8	262		2.9
19			255		8.8			2.9
20			260		8.4			2.9
21			270		7.8			2.8
22			310		7.0			2.7
23			312		7.0			2.5

Time: 0.0°.

Sweep: 3.1 Mc to 11.8 Mc in 6 minutes, automatic operation.

Table 31\*

Falkland Is. ( $51.7^{\circ}\text{S}$ ,  $57.8^{\circ}\text{W}$ )

August 1948

Time	$\text{h}^{\circ}\text{F2}$	$\text{f}^{\circ}\text{F2}$	$\text{h}^{\circ}\text{F1}$	$\text{f}^{\circ}\text{F1}$	$\text{h}^{\circ}\text{E}$	$\text{f}^{\circ}\text{E}$	$\text{fE}_s$	F2-M3000
00	386	3.6				2.4		
01	383	3.6				2.4		
02	372	3.6				2.4		
03	355	3.5				2.5		
04	312	3.5				2.6		
05	296	3.4				2.7		
06	273	3.2				2.9		
07	244	6.2			2.3		3.2	
08	226	(7.6)			135	2.5	3.2	
09	224	8.6			119	2.7	3.2	
10	232	10.2			110#	2.9#	3.2	
11	229	10.0			115#	3.1#	3.2	
12	231	10.2	240#	5.6#	110#	3.2#	3.2	
13	234	9.5	230#	5.2#				
14	227	(9.1)			140#	2.7#	3.2	
15	235	(8.6)			120#	2.7#	3.3	
16	230	(7.5)			2.5#		3.1	
17	239	6.6				3.1		
18	257	5.1				3.0		
19	258	4.4				3.0		
20	289	3.8				2.8		
21	326	3.4				2.5		
22	356	3.5				2.5		
23	367	3.6			2.6	2.4		

Time: Local.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute.

\*Average values except f<sup>o</sup>F2 and fE<sub>s</sub>, which are median values.

#One or two observations only.

TABLE 32  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

National Bureau of Standards  
Scaled by E.J.W. J.J.S. J.M.C.

Form adopted June 1946

$\text{hF}_2$  Km April 1949

(Characteristic) (Unit) (Month)

Observed at Washington, D.C.

Lat 39°0'N Long 77°5'W

IONOSPHERIC DATA

75°W Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	2.50	2.70	2.80	2.80	2.50	2.50	2.50	2.50	2.50	2.50	2.20	2.20	2.20	2.00	2.80	2.70	2.30	2.30	2.40	2.30	2.50	2.50	2.60		
2	2.50	2.70	2.60	2.60	2.70	2.60	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
3	2.70	2.60	2.90	(2.6) <sup>S</sup>	2.60	2.70	2.50	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40		
4	2.70	2.70	3.00	(2.6) <sup>S</sup>	3.00	2.70	2.50	2.40	2.40	2.40	2.20	2.20	2.20	2.00	[2.7] <sup>L</sup>	2.00	2.20	2.00	2.00	2.50	2.50	2.50	2.50	2.50	
5	2.60	2.80	2.60	2.50	2.50	2.50	2.50	2.40	2.40	2.40	2.20	2.20	2.20	2.00	2.80	2.50 <sup>H</sup>	2.20	2.30	2.40	2.40	2.50	2.50	2.50	2.50	
6	2.70	2.50	2.50	2.50	2.50	2.50	2.50	2.40	2.40	2.40	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.40	2.40	2.40	2.40	2.40	(2.7) <sup>S</sup>	
7	2.50	2.50	2.40	2.50	2.50	2.50	2.60	2.60	2.60	2.60	2.40	2.40	2.40	2.40	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
8	4.00 <sup>F</sup>	3.80 <sup>F</sup>	4.20 <sup>K</sup>	4.00 <sup>F</sup>	3.80 <sup>K</sup>	4.00 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>	3.80 <sup>K</sup>							
9	3.00 <sup>K</sup>	3.00 <sup>K</sup>	3.00 <sup>K</sup>	3.00 <sup>K</sup>	3.00 <sup>K</sup>	3.00 <sup>K</sup>	3.00 <sup>K</sup>	2.60	2.60	2.60	2.40	2.40	2.40	2.40	[2.6] <sup>L</sup>	2.20	2.30	2.30	2.30	2.40	2.50	2.50	2.50	2.50	
10	3.00	3.20 <sup>K</sup>	3.00	3.20 <sup>K</sup>	3.00	3.20 <sup>K</sup>	3.00	2.90 <sup>K</sup>	2.90 <sup>K</sup>	2.90 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.50 <sup>K</sup>	2.30	2.30	2.30	2.30	2.40	2.50	2.50	2.50	2.50	
11	2.70	(2.6) <sup>S</sup>	2.70	2.60	2.70	3.00	2.70	2.50	2.50	2.50	2.70 <sup>H</sup>	2.60	2.60	2.60	2.80	3.50	3.30	2.30	2.30	2.50	2.50	2.60	2.60	2.70	
12	2.60	2.60	2.80 <sup>K</sup>	2.80 <sup>K</sup>	3.00 <sup>K</sup>	3.50 <sup>K</sup>	3.10 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.40 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>	2.60 <sup>K</sup>		
13	3.40 <sup>C</sup>	2.90 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.70 <sup>K</sup>	3.10 <sup>K</sup>	3.10 <sup>K</sup>	3.10 <sup>K</sup>	2.40 <sup>K</sup>	2.40 <sup>K</sup>	2.40 <sup>K</sup>	2.40 <sup>K</sup>	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
14	2.90	2.70	2.80	2.80	2.70	2.80	2.80	2.50	2.50	2.50	2.20 <sup>H</sup>	2.20 <sup>H</sup>	2.20 <sup>H</sup>	2.20 <sup>H</sup>	[3.0] <sup>L</sup>	[3.0] <sup>L</sup>	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	
15	2.80 <sup>F</sup>	2.70	2.60	2.70	2.50	2.70	2.70	2.50	2.50	2.50	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	
16	2.80	2.80	2.50	2.50	2.70	2.70	2.50	2.50	2.50	2.50	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	
17	3.00	2.80 <sup>(2.7)<sup>S</sup></sup>	(2.7) <sup>S</sup>	2.80	2.70	2.70	2.70	2.70	2.70	2.70	2.50	2.50	2.50	2.50	[2.7] <sup>L</sup>	[2.7] <sup>L</sup>	3.30	3.30	2.30	2.30	2.50	2.50	2.50	2.50	
18	2.90	2.60	2.60	2.50	2.50	2.80	2.50	2.30	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	
19	3.00	2.90	2.80	2.80	3.00	3.20	2.70 <sup>K</sup>	2.70 <sup>K</sup>	2.60	2.60	2.50 <sup>H</sup>	3.50 <sup>K</sup>	3.90 <sup>K</sup>	3.90 <sup>K</sup>	4.40 <sup>K</sup>	4.50 <sup>K</sup>	4.60 <sup>K</sup>	4.60 <sup>K</sup>	4.60 <sup>K</sup>	4.60 <sup>K</sup>	4.60 <sup>K</sup>	4.60 <sup>K</sup>	4.60 <sup>K</sup>		
20	3.00 <sup>K</sup>	C	C	C	C	C	C	C	C	C	3.30	2.50	2.70	2.70	3.30	3.00	3.50	3.00	(2.6) <sup>S</sup>	2.30	2.50	2.50	2.50	2.50	
21	2.80	2.90 <sup>F</sup>	2.80 <sup>F</sup>	(2.8) <sup>S</sup>	2.70 <sup>F</sup>	2.70 <sup>F</sup>	2.70 <sup>F</sup>	2.70 <sup>F</sup>	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	
22	2.70	2.80	2.60	2.50	2.60	2.40	2.30	2.20	2.10	2.00	3.00	[3.4] <sup>L</sup>	3.40	2.60	2.20	2.20	2.20	2.20	2.40	2.40	2.50	2.50	2.50	2.50	2.50
23	2.90	2.80	3.00	2.90	3.00	2.60	2.40	2.30	2.20	2.10	3.20	3.60	3.60	3.80	3.30	3.60 <sup>H</sup>	3.30	3.30	2.50	2.50	2.70	2.70	2.70	2.70	2.70
24	3.00	3.00	2.90	2.60	2.60	2.50	2.80	2.50	2.50	2.50	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	
25	2.80	2.80	(2.6) <sup>S</sup>	2.50	2.80	2.80	2.80	2.70	2.70	2.70	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	
26	3.00	2.80	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
27	3.30	3.00	2.70	(3.0) <sup>S</sup>	2.70	2.60	2.50	2.30	2.20	2.00	2.80	2.10	3.40	2.70	3.50	3.30	2.30	2.30	2.50	2.50	2.70	2.70	2.70	2.70	2.70
28	2.90	(3.0) <sup>S</sup>	3.00	2.90	2.90	2.80	2.60	2.40	2.20	2.00	2.50	3.20	3.40	3.70	3.80	2.50	2.50	2.50	2.50	(2.7) <sup>A</sup>	A	2.80	3.00	3.00	
29	2.80	2.80	(2.6) <sup>S</sup>	2.70	2.60	2.80	2.60	2.40	2.40	2.40	2.40	2.80	3.60	3.60	3.90	C	C	C	2.40	2.40	2.40	2.40	2.40	2.40	2.40
30	2.30	2.40	2.80	2.70	2.80	2.90	2.90	2.70	2.70	2.70	3.00	3.40	3.20	3.20	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	
31																									
Median	2.80	2.80	2.70	2.70	2.80	2.60	2.40	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.40	2.40	2.40	2.40	2.40	2.40	
Count	30	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	30	30	30	30	30	30

Sweep I.O. Mc to 25.0 Mc in 0.25 min  
Manual □ Automatic ☒

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**TABLE 33**  
**IONOSPHERIC DATA**National Bureau of Standards  
Institutional J.J.S., G.P.G.f0F2, Mc April, 1949  
(Characteristic) (Unit) (Month)Observed at Washington, D. C.  
Lat 39.0°N, Long 77.5°W

75°W Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	(7.1) <sup>J</sup>	(2.0) <sup>J</sup>	(6.1) <sup>J</sup>	(6.8) <sup>J</sup>	(5.9) <sup>J</sup>	(5.4) <sup>J</sup>	(8.3) <sup>J</sup>	(0.0)	0.6	1.1.0	1.1.5	1.2.0	1.1.8	(1.2.3) <sup>J</sup>	(1.1.0) <sup>J</sup>	(1.0.2) <sup>J</sup>	(1.0.0) <sup>J</sup>	(1.0.2) <sup>J</sup>	(1.0.2) <sup>J</sup>	(1.0.2) <sup>J</sup>	8.6	8.4	8.2			
2	8.0	7.2	6.8	(6.6) <sup>J</sup>	6.4 <sup>F</sup>	6.2 <sup>F</sup>	(7.1) <sup>J</sup>	C	C	1.1.6	1.2.0	1.2.2	1.2.0	1.2.0	1.1.3	(1.1.2) <sup>J</sup>	(1.0.2) <sup>J</sup>	8.7	8.5	8.0	(2.6) <sup>J</sup>					
3	(7.3) <sup>S</sup>	(2.1) <sup>J</sup>	6.6	F	6.6	6.4 <sup>F</sup>	6.6	2.0	8.5	(9.6) <sup>J</sup>	10.8	11.2	11.6	11.3	11.1	10.0	(1.0.5) <sup>J</sup>	(1.0.5) <sup>J</sup>	8.4	2.9	2.5	(2.6) <sup>J</sup>				
4	(2.4) <sup>J</sup>	(2.2) <sup>J</sup>	(6.6) <sup>J</sup>	(6.6) <sup>J</sup>	6.5 <sup>F</sup>	6.7 <sup>F</sup>	2.1	2.9	9.0	9.0	(9.3) <sup>J</sup>	10.1	10.8	10.9	10.7	10.4	10.2	10.2	9.2	9.2	8.4	(2.9) <sup>J</sup>	(8.3) <sup>J</sup>	8.2		
5	(2.4) <sup>J</sup>	(6.8) <sup>J</sup>	(7.1) <sup>J</sup>	(7.1) <sup>J</sup>	6.6	6.5 <sup>F</sup>	5.6 <sup>F</sup>	5.4	8.4	(9.7) <sup>J</sup>	10.3	11.1	11.3	11.8	(1.1.3) <sup>J</sup>	(1.0.2) <sup>J</sup>	(1.0.0) <sup>J</sup>	8.6	(8.0) <sup>J</sup>	8.1						
6	(8.4) <sup>S</sup>	(2.6) <sup>J</sup>	(7.1) <sup>J</sup>	(7.1) <sup>J</sup>	6.4 <sup>F</sup>	(5.7) <sup>J</sup>	5.6 <sup>F</sup>	6.7	8.4	7	10.5	11.0	11.5	11.4	11.2	11.2	11.1	10.5	(1.0.2) <sup>J</sup>	(1.0.2) <sup>J</sup>	(1.0.2) <sup>J</sup>	(1.0.2) <sup>J</sup>	8.6	8.6		
7	8.5	8.0	2.0	6.2	5.2	5.3 <sup>F</sup>	6.5	8.3	9.6	9.8	10.6	11.0	11.4	11.9	11.0	10.8	(1.0.0) <sup>J</sup>	(4.5) <sup>J</sup>								
8	K(4.5) <sup>J</sup>	K(3.8) <sup>J</sup>	(2.6) <sup>J</sup>	(2.6) <sup>J</sup>	3.1 <sup>F</sup>	2.9 <sup>F</sup>	3.6 <sup>F</sup>	4.0 <sup>F</sup>	4.3 <sup>J</sup>	C	K	K(4.3) <sup>J</sup>	K(4.3) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K(4.6) <sup>J</sup>	K		
9	K(4.1) <sup>J</sup>	K(2.2) <sup>J</sup>	3.6 <sup>J</sup>	3.6 <sup>J</sup>	3.5 <sup>F</sup>	3.3 <sup>F</sup>	3.3 <sup>F</sup>	3.7	5.2	2.5	8.2	8.7	9.5	9.7	(9.7) <sup>J</sup>	10.5	10.2	10.2	10.2	10.0	(9.8) <sup>J</sup>	9.4	8.3	(2.5) <sup>J</sup>		
10	6.6	(6.0) <sup>J</sup>	6.3 <sup>J</sup>	6.3 <sup>J</sup>	5.2 <sup>J</sup>	5.5 <sup>J</sup>	(5.3) <sup>J</sup>	5.7 <sup>J</sup>	6.0 <sup>J</sup>	7.0 <sup>J</sup>	7.4 <sup>J</sup>	7.8 <sup>J</sup>	8.5 <sup>J</sup>	9.0 <sup>J</sup>	9.7 <sup>J</sup>	9.6 <sup>J</sup>	9.6 <sup>J</sup>	9.5	9.5	9.6	9.5	9.6	9.5	9.5		
11	6.3	5.9	5.2 <sup>F</sup>	5.2 <sup>F</sup>	4.8 <sup>J</sup>	4.5 <sup>F</sup>	6.3	8.5	9.6	9.8	10.0	10.7	11.0	11.2	11.2	11.2	11.0	10.5	(1.0.0) <sup>J</sup>	(1.0.0) <sup>J</sup>	(1.0.0) <sup>J</sup>	(1.0.0) <sup>J</sup>	8.6	8.6		
12	(6.9) <sup>J</sup>	(6.4) <sup>J</sup>	(5.3) <sup>J</sup>	(5.3) <sup>J</sup>	4.8 <sup>J</sup>	4.1 <sup>F</sup>	3.9 <sup>J</sup>	4.9 <sup>J</sup>	5.9 <sup>J</sup>	6.3 <sup>J</sup>	(6.1) <sup>J</sup>	5.9 <sup>J</sup>	6.5 <sup>J</sup>	6.0 <sup>J</sup>	6.1 <sup>J</sup>	6.1 <sup>J</sup>	6.0 <sup>J</sup>	5.7								
13	5.6 <sup>J</sup>	5.6 <sup>J</sup>	(5.6) <sup>J</sup>	(5.6) <sup>J</sup>	4.2 <sup>J</sup>	4.1 <sup>J</sup>	(4.1) <sup>J</sup>	6.1	8.5	(10.0) <sup>J</sup>	(1.5) <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	10.4 <sup>J</sup>	2.7			
14	7.0	6.2	6.2	6.5	(5.7) <sup>J</sup>	(4.9) <sup>J</sup>	3.2 <sup>F</sup>	3.2 <sup>F</sup>	3.7	6.2	20	7.3	7.8	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	2.1		
15	(7.7) <sup>J</sup>	(2.6) <sup>J</sup>	2.2	6.4	6.1	5.7	7.3	8.6	(9.8) <sup>J</sup>	10.8	11.0	11.9	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	2.9			
16	7.5	2.0	2.0	6.5	6.4	6.1	(6.9) <sup>J</sup>	8.0	9.0	9.4	10.2	11.7	11.7	12.2	(1.2.3) <sup>J</sup>	11.9	11.3	(1.1.2) <sup>J</sup>	(1.1.0) <sup>J</sup>	(1.0.8) <sup>J</sup>	(1.0.8) <sup>J</sup>	9.0	(8.0) <sup>J</sup>	8.0		
17	7.7	2.3	2.1	6.6	5.2	5.6	6.3	2.1	8.0	8.8	9.4	9.3	9.6	9.7	9.7	9.7	9.4	9.4	(1.9) <sup>J</sup>	8.5	2.8	(2.1) <sup>J</sup>	7.0			
18	7.1	6.9	6.5	6.7	5.0	5.0	6.8	8.3	9.0	8.8	9.2	9.8	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	(10.3) <sup>J</sup>	2.9	
19	6.7	6.7	6.6	(5.7) <sup>J</sup>	5.3	5.0	6.4 <sup>F</sup>	(6.8) <sup>J</sup>	(6.9) <sup>J</sup>	(6.9) <sup>J</sup>	20 <sup>K</sup>	6.9 <sup>K</sup>	20 <sup>K</sup>	23 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	24 <sup>K</sup>	24 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	2.6		
20	6.3 <sup>J</sup>	C	C	C	C	C	C	C	C	C	C	C	C	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	6.3
21	7.3	2.1	F	6.7 <sup>J</sup>	(6.8) <sup>J</sup>	6.7 <sup>J</sup>	6.6 <sup>F</sup>	7.5	8.3	8.7	9.3	9.5	9.6	9.7	9.9	9.9	9.3	9.3	9.5	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	9.0		
22	6.9	6.9	6.8	6.7	6.4	6.1 <sup>F</sup>	8.3	10.1	-0.3	11.0	11.4	11.7	12.0	12.3	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	2.2		
23	(7.7) <sup>J</sup>	6.8	6.6	6.6 <sup>F</sup>	6.5 <sup>F</sup>	6.0	6.5 <sup>F</sup>	6.0	6.5 <sup>J</sup>	2.9	8.3	8.9	9.7	9.5	9.7	9.3	9.4	9.1	8.8	8.6	8.4	8.3	8.2	6.8		
24	6.6	6.4	6.3	6.2 <sup>F</sup>	5.5	2.2	8.6	9.6	9.6	10.3	10.5	10.2	10.5	10.5	10.4	10.4	10.2	9.8	9.4	9.4	9.2	9.0	8.1	2.6		
25	7.3	2.0	2.0	6.3	5.7	5.8	20	8.3	9.6	10.0	10.5	11.0	11.5	11.5	11.5	11.5	10.9	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	9.0	8.3	(8.0) <sup>J</sup>	2.8	
26	7.9	2.9	2.2	2.0	2.1	(2.1) <sup>J</sup>	8.5 <sup>J</sup>	(1.0.0) <sup>J</sup>	(1.0.0) <sup>J</sup>	[0.05] <sup>J</sup>	11.2	11.4	11.3	11.2	11.2	11.2	11.2	10.8	10.8	11.0	10.6	10.4	9.7	9.5	8.9	
27	6.8	2.8	(6.7) <sup>J</sup>	6.1	6.3	(5.8) <sup>J</sup>	6.7	8.4	9.0	9.6	10.0	10.2	10.3	10.2	10.2	10.2	10.0	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	(1.9) <sup>J</sup>	9.3	8.5	2.8	6.9	
28	20	(6.8) <sup>J</sup>	6.5	6.4	6.3	6.5	2.6	29	8.1	8.6	9.1	9.9	9.2	9.8	9.8	9.8	9.9	9.5	9.3	9.4	8.6	8.1	2.5	2.0		
29	6.6	6.5	6.5	6.2	5.7	5.7	2.4	8.5	9.5	9.7	10.4	10.8	9.9	10.2	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	(8.1) <sup>J</sup>		
30	28	21	2.1	6.9	6.5 <sup>J</sup>	(5.7) <sup>J</sup>	5.8	2.3	8.4	9.6	10.3	10.5	11.0	11.2	11.4	11.4	11.2	10.8	10.4	10.5	10.2	9.8	9.0	8.7	8.4	
31																										
Median	21	6.9	6.6	6.3	5.7	5.6	6.7	8.3	9.2	9.6	10.2	10.6	10.6	10.6	10.5	10.3	10.0	9.7	(9.4)	8.6	8.0	2.8	2.4			
Count	30	29	29	29	29	29	29	28	28	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	

Sweep 1.0 Mc to 250 Mc in 0.25 min

Manual □ Automatic ■

U. S. GOVERNMENT PRINTING OFFICE: 1946 O-12421A

**TABLE 34**  
 Ionosphere, National Bureau of Standards  
**IONOSPHERIC DATA**

**Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D C**

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.  
TABLE 35  
IONOSPHERIC DATA

Day	75°W Mean Time												75°W Mean Time													
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1									Q	Q	210	200	Q	220	200	Q	Q	Q	Q	Q	Q	Q	Q	Q		
2									C	C	Q	200	200	Q	200	220	220									
3									Q	Q	200	200	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
4									Q	Q	200	200	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
5									Q	Q	Q	220	220	220	220	Q	Q	Q	Q	Q	Q	Q	Q	Q		
6									Q	Q	Q	200	210	200	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
7									220	Q	200	Q	200	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
8									250	K	210	K	220	H	230	K	250	K	240	K	240	K	260	K		
9									Q	210	200	Q	200	210	Q	230	Q	230	Q	230	Q	Q	Q	Q		
10									Q	230	K	210	K	200	H	210	K	230	K	240	K	240	K	260	K	
11									Q	220	190	210	H	210	210	Q	200	210	Q	230	Q	230	Q	Q		
12									Q	230	K	220	K	200	K	210	X	(230)	K	240	K	240	K	230	K	
13									Q	Q	190	Q	Q	Q	210	Q	Q	Q	Q	Q	Q	Q	Q	Q		
14									Q	220	H	200	200	210	Q	210	Q	210	Q	210	Q	210	Q	Q		
15									220	H	210	220	230	220	220	Q	200	220	H	Q	Q	Q	Q	Q		
16									Q	200	H	Q	Q	200	A	Q	Q	Q	Q	Q	Q	Q	Q	Q		
17									Q	200	200	200	(220)	230	220	Q	Q	Q	Q	Q	Q	Q	Q	Q		
18									Q	200	200	200	200	200	200	210	Q	Q	Q	Q	Q	Q	Q	Q		
19									220	K	220	K	(250)	S	(240)	K	230	K	260	K	260	K	230	K	230	K
20									C	240	200	180	220	220	200	200	220	Q	Q	Q	Q	Q	Q	Q	Q	
21									230	Q	200	Q	200	Q	200	(230)	Q	Q	Q	Q	Q	Q	Q	Q	Q	
22									Q	Q	Q	220	220	210	210	210	Q	Q	Q	Q	Q	Q	Q	Q	Q	
23									Q	220	210	200	220	220	220	210	210	230	Q	Q	Q	Q	Q	Q	Q	
24									Q	Q	Q	230	230	200	200	200	200	200	230	Q	Q	Q	Q	Q	Q	Q
25									Q	Q	210	200	200	200	230	220	Q	Q	Q	Q	Q	Q	Q	Q	Q	
26									C	Q	210	210	200	230	230	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
27									Q	210	200	Q	220	210	200	230	Q	Q	Q	Q	Q	Q	Q	Q	Q	
28									Q	(230)	H	200	220	210	230	200	Q	Q	Q	Q	Q	Q	Q	Q	Q	
29									Q	220	200	A	(240)	S	(230)	S	250	C	C	C	C	C	C	C	C	C
30									Q	Q	220	H	200	200	230	230	230	210	Q	Q	Q	Q	Q	Q	Q	Q
31																										
Median		220	220	200	200	210	210	215	230	225	-															
Count		5	14	24	23	26	24	20	14	20	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	

Sweep 1.0 Mc to 250 Mc in 0.25 min  
Manual  Automatic

TABLE 36  
IONOSPHERIC DATA  
Lat. 39.0°N., Long. 77.5°W.  
Washington, D. C.  
f<sub>oF1</sub> — Mc (Characteristic) — April, 1949  
Observed at (Month)

Day	75°W Mean Time												National Bureau of Standards													
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Calculated by E, J.W., J.J.S., G.P.G., J.J.S., L.H.	Scaled by J.M.C.
1																										
2																										
3																										
4																										
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29																										
30																										
31																										
	Median																									
	Count																									

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual  Automatic

TABLE 37  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.  
IONOSPHERIC DATA

$hE$       Km      April, 1949  
(Characteristic)    (Unit)    (Month)

Observed at Washington, D.C.

Lat. 39°0'N, Long. 77°5'W

75°W

Mean Time

National Bureau of Standards  
Scaled by E.J.W., J.J.S., J.M.C.  
(Institution) J.J.S.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																								
2																								
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30																								
31																								
Median	120	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Count	22	28	27	28	30	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	

Sweep 1.0 Mc to 25.0 Mc in 0.25 min  
Manual  Automatic

TABLE 38  
IONOSPHERIC DATA  
75°W      Mean Time  
April, 1949  
Washington, D. C.  
Lat 39°N Long 77.5°W

Day	Mc (Ultracore) (Unit)												Mc (Ultracore) (Unit)												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
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27																									
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29																									
30																									
31																									
Median		20	24	31	34	36	37	38	39	38	36	34	32	31	30	29	28	27	26	25	24	23	22	21	20
Count		21	28	28	29	29	27	26	26	25	27	28	28	29	29	29	29	29	29	29	29	29	29	29	29

sweep 1.0 Mc to 25.0 Mc in 0.25-min.

Manual  Automatic

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

TABLE 39  
IONOSPHERIC DATA

Es (Characteristic) Mc, Km April 1949

(Unit) (Month)

Observed at Washington, D. C.

Lat 39°N Long 77.5°W

Form 200-1046 June 1946

National Bureau of Standards

Scaled by E. J. W., J. S. (Institution)

J. M. C.

Calculated by L. H., G. P. G., J. J. S.

Day	75°W Mean Time												75°W															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	G	G	G	G	G	G	G	37 1/30	35 1/30	33 1/30	42 1/30	G	G	G	G	G	G	G	G	G	24 1/30	G	G	G				
2	G	G	G	G	G	G	C	C	C	G	43 1/30	40 1/10	37 1/10	35 1/10	G	G	42 1/20	46 1/10	G	G	G	G	G	G				
3	G	G	G	G	G	G	24 1/10	37 1/10	G	G	40 1/10	G	G	G	40 1/10	G	34 1/10	G	G	G	G	G	G	G				
4	G	G	G	G	G	G	23 1/20	G	G	G	41 1/10	G	G	G	38 1/10	G	38 1/10	G	G	G	23 1/30	27 1/10	G	G	G			
5	G	G	G	G	G	G	38 9/10	37 1/10	36 1/10	G	G	G	G	42 1/20	52 1/20	42 1/20	G	35 1/20	43 1/30	G	G	G	G	G	G			
6	G	G	G	G	G	G	43 1/30	47 1/10	49 1/10	G	37 1/00	38 1/00	40 1/00	41 1/00	G	G	23 1/30	24 1/10	34 1/10	26 1/00	28 1/00							
7	24 1/00	52 1/10	G	G	G	G	37 1/20	43 1/30	50 1/00	36 1/20	37 1/00	38 1/00	35 1/00	39 1/00	G	G	23 1/30	24 1/10	34 1/10	26 1/00	28 1/00							
8	G	G	G	G	G	G	22 1/20	G	G	27 1/10	G	C	G	98 1/30	39 1/10	G	G	37 1/20	G	36 1/30	31 1/0	G	G	G	G			
9	G	G	G	G	G	G	37 1/20	25 1/10	29 1/30	36 1/00	G	90 1/00	36 1/00	G	G	40 1/20	46 1/00	G	G	36 1/00	41 1/00	34 1/00	26 1/00	28 1/00				
10	G	G	G	G	G	G	64 1/20	28 1/20	100	G	G	40 1/00	40 1/00	36 1/00	G	B	B	B	B	25 1/20	G	G	23 1/20	G				
11	G	G	G	G	G	G	37 1/90	G	G	38 1/20	39 1/20	G	G	G	G	52 1/30	40 1/20	G	G	23 1/30	27 1/10	36 1/10	G	G	G	G		
12	G	G	G	G	G	G	54 1/00	G	G	G	38 1/20	39 1/10	G	G	52 1/30	40 1/20	G	G	23 1/30	27 1/10	32 1/20	G	G	G	G			
13	G	G	G	G	G	G	40 1/00	G	G	38 1/100	42 1/100	36 1/100	40 1/90	G	G	38 1/100	38 1/100	G	G	G	G	36 1/10	G	G	G			
14	G	G	G	G	G	G	38 1/100	42 1/100	36 1/100	40 1/90	G	G	G	G	38 1/100	38 1/100	G	G	G	G	G	G	G	G				
15	22 1/100	G	G	G	23 1/30	37 1/90	42 1/00	62 1/60	40 1/10	G	G	G	G	G	G	38 1/20	37 1/00	G	G	G	G	G	G	G				
16	23 1/100	G	21 1/00	G	G	G	35 1/30	32 1/30	37 1/10	37 1/10	36 1/100	48 1/60	44 1/00	44 1/00	42 1/00	G	36 1/00	41 1/00	G	19 1/20	32 1/10	37 1/10	G	G	G	G		
17	G	G	32 1/00	G	G	G	37 1/60	38 9/10	38 1/10	G	38 1/30	41 1/30	43 1/30	40 1/30	38 1/30	37 1/20	G	30 1/40	G	G	G	24 1/50						
18	32 1/100	32 1/20	11 1/10	32 1/00	G	G	43 1/00	38 1/00	36 1/00	37 1/30	30 1/90	50 1/00	66 1/00	31 1/100	40 1/00	36 1/00	43 1/00	19 1/00	34 1/00	34 1/00	28 1/00							
19	G	26 1/00	26 1/00	G	G	G	43 1/20	30 1/30	G	40 1/20	42 1/10	40 1/100	40 1/100	40 1/100	40 1/100	G	G	40 1/00	G	G	G	25 1/10	27 1/10	G	G			
20	G	C	C	C	C	C	C	C	C	48 1/00	G	40 1/00	G	37 1/00	28 1/00	G	38 1/00	34 1/00	31 1/00	G	G	G	G					
21	G	G	G	G	G	G	41 1/10	54 1/10	41 1/10	43 1/10	46 1/10	48 1/10	G	49 1/10	53 1/10	46 1/00	42 1/00	37 1/00	37 1/20	20 1/10	G	G	G	23 1/00				
22	G	38 1/30	36 1/00	G	G	G	21 1/10	37 1/30	37 1/10	G	78 1/20	G	G	G	40 1/00	45 1/10	38 1/20	G	G	G	G	G	G	G	G			
23	23 1/10	26 1/10	G	G	G	31 1/20	39 1/90	41 1/100	47 1/10	36 1/00	37 1/00	G	G	G	G	40 1/20	44 1/10	34 1/20	22 1/10	32 1/10	31 1/10	31 1/10	G					
24	24 1/00	24 1/00	27 1/00	G	G	G	19 1/100	G	G	36 1/10	50 1/10	56 1/10	38 1/10	G	G	55 1/20	70 1/10	19 1/00	22 1/00	30 1/00	31 1/00	22 1/20	G					
25	G	G	G	G	G	G	37 1/10	48 1/10	G	G	G	G	G	G	G	G	G	19 1/10	G	G	G	G	G	G	G			
26	G	G	25 1/20	23 1/20	38 1/00	38 1/00	G	C	40 1/10	G	G	G	G	G	G	49 1/60	44 1/00	48 1/00	34 1/00	38 1/00	10 1/0	35 1/00	38 1/00					
27	G	G	G	G	G	G	24 9/10	31 1/30	47 1/10	47 1/100	G	G	G	G	47 1/10	47 1/10	G	G	47 1/10	47 1/10	31 1/00	G	G	G	G			
28	G	G	G	G	G	G	21 1/40	G	32 1/40	G	34 1/20	52 1/10	52 1/00	G	G	G	G	43 1/10	38 1/10	35 1/10	31 1/00	53 1/10	67 1/10	37 1/10	G			
29	G	G	23 1/30	24 1/30	27 1/20	36 1/20	41 1/20	47 1/20	49 1/10	60 1/100	49 1/100	50 1/00	43 1/00	G	G	64 1/00	C	C	G	19 1/00	18 1/00	C	C	G	G	G		
30	G	G	28 1/10	G	32 1/20	33 1/20	35 1/30	43 1/20	40 1/20	39 1/20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G			
31																												
Median	**	**	**	**	**	**	**	**	**	36	37	38	37	34	36	**	**	32	**	**	20	**	**	**	**			
Count	30	27	29	29	29	29	27	28	30	30	30	30	30	30	30	27	28	29	30	30	30	29	30	30	30	30		

\*\* MEDIAN FEES LESS THAN MEDIAN FOR LESS THAN LOWER FREQUENCY LIMIT OF RECORDER

Sweep 10 Mc to 25.0 Mc in 0.25-min

Manual □ Automatic ■

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

Form adopted June 1946  
National Bureau of Standards  
Calculated by: E.J.W., J.J.S., L.H., G.P.G.  
(Institution) J.M.C.

**TABLE 40**  
**IONOSPHERIC DATA**

(M1500)F2, (Unit)  
Washington, D.C.

April, 1949  
(Month)

Observed at Lat. 39.0°N, Long. 77.5°W

Day	75°W Mean Time																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	(1.9)²	(1.8)⁷	(1.9)³	(1.8)³	(1.9)⁵	(1.9)⁵	(2.0)⁵	(2.0)⁵	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	
2	1.9	1.8	1.9	(1.8)⁵	1.8	F	1.8	F	1.8	F	1.8	F	1.8	F	1.8	F	1.8	F	1.8	F	1.9	1.9	1.9	1.9	1.8
3	(1.8)⁵	(1.8)⁰	1.7	1.7	1.8	F	1.8	F	1.8	F	2.1	2.1	(2.0)⁵	(2.0)⁵	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8	
4	4	(1.9)⁵	(2.0)⁵	(1.9)⁵	1.7	F	1.7	1.8	F	2.0	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8	
5	5	(1.8)⁵	(1.9)³	(1.8)⁵	1.8	F	1.8	1.8	1.9	2.0	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8	
6	6	(1.8)⁵	(1.9)⁵	1.9	F	(2.0)⁵	1.9	F	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8
7	7	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	2.0	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
8	8	K <sub>4</sub> (4)⁵	(1.5)⁵	(1.5)⁵	1.5	F	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
9	9	K <sub>4</sub> (4)⁵	(1.5)⁵	(1.5)⁵	1.5	F	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
10	10	1.6	(1.5)⁵	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
11	11	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
12	12	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
13	13	1.5	K	1.7	K	(1.7)⁵	(1.7)⁵	(1.7)⁵	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
14	14	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.8	1.7	
15	15	(1.8)⁵	(1.8)⁵	1.9	1.7	1.8	1.8	2.0	2.0	(2.0)⁵	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.8	
16	16	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
17	17	1.7	1.7	1.8	1.7	1.8	1.7	1.7	1.8	2.0	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
18	18	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	1.9	2.0	1.9	2.0	
19	19	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	
20	20	1.7	K	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
21	21	1.7	1.8	F	1.7	1.8	1.7	1.8	1.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	2.0	2.0	2.0	
22	22	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
23	23	(1.7)⁵	1.8	1.6	1.7	F	1.7	1.7	1.8	(1.8)⁵	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
24	24	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	
25	25	1.8	1.2	1.8	1.8	1.7	1.9	2.1	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
26	26	1.7	1.7	1.7	1.7	1.8	(1.9)⁵	2.0	(1.9)⁵	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
27	27	1.6	1.7	(1.8)⁵	1.6	1.8	(1.8)⁵	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
28	28	1.7	(1.7)⁵	1.7	1.7	1.7	1.7	1.7	1.8	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
29	29	1.8	1.7	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
30	30	1.9	1.9	1.7	1.8	(1.8)⁵	1.8	2.0	2.0	2.1	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
31	31																								

Sweep 1.0 Mc to 25.0 Mc in 0.25-min  
Manual  Automatic

Attachment (a) NBS (1946)

**TABLE 41**  
**IONOSPHERIC DATA**

(M3000)F2,      April, 1949  
 (Ura)      (Month)  
 Observed at      Washington, D. C.  
 Lat 39°0'N, Long 77.5°W

National Bureau of Standards  
 (Institution), J. M. C.

Scaled by: E. J. W. J. J. S. L. H. Calculated by:

75°V												75°V												
Mean Time												Mean Time												
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	(2.9)3	(2.8)5	(2.8)3	(2.8)3	(2.9)5	(2.9)5	(3.1)5	(3.1)5	3.0	2.9	2.9	2.9	2.9	2.9	2.8	(2.9)7	2.8	(3.0)5	(2.9)5	(3.0)5	(2.9)5	2.8	2.9	
2	2.9	2.8	2.9	(2.8)5	2.7	2.7	(3.0)5	C	C	3.0	2.9	2.8	2.9	2.8	2.9	(2.9)5	2.9	(3.0)5	3.0	(2.9)5	2.9	2.8	(2.8)5	
3	(2.7)5	(2.8)5	2.6	2.6	2.7	2.7	2.8	3.1	3.1	(3.1)5	3.0	2.9	2.8	2.8	2.8	(2.8)5	2.8	(2.9)5	(2.9)5	(2.9)5	2.9	2.9	(2.7)5	
4	(2.8)5	(2.8)5	(2.6)5	2.6	2.5	2.7	2.7	3.0	3.1	3.0	(3.0)5	2.9	2.8	3.1	2.8	2.8	2.8	2.8	2.9	2.9	2.7	(2.8)5	2.8	
5	(2.7)5	(2.9)5	(2.8)5	2.8	2.6	2.7	2.7	2.8	3.0	(3.1)5	2.9	3.0	3.0	2.8	(2.8)5	(2.8)5	2.8	2.8	2.9	(2.9)5	(3.0)5	2.9	(3.0)5	
6	(2.7)5	(2.9)5	(2.8)5	(2.8)5	2.8	2.8	(2.8)5	3.0	3.0	3.0	2.9	2.9	2.8	2.8	2.9	(2.9)5	2.9	(2.9)5	(3.0)5	(2.9)5	2.9	2.8	2.7	
7	3.0	2.9	2.8	2.7	2.7	2.7	3.0	3.1	3.2	3.0	2.8	2.8	2.7	2.8	2.7	2.7	2.7	(2.7)5	(2.9)5	(2.7)5	2.6	(2.7)5		
8	(2.2)5	(2.3)5	(2.3)5	(2.3)5	2.4	2.4	2.4	2.5	2.5	3.0	6	K	C	K	G	K	G	K	G	K	G	K	G	
9	(2.5)5	2.6	K	2.5	2.6	2.6	2.7	2.7	3.1	2.0	2.9	2.9	2.8	(2.7)5	2.8	2.7	2.7	2.7	2.9	(2.9)5	(3.0)5	2.9	(3.0)5	
10	2.4	(2.4)2	2.5	2.5	(2.6)5	(2.6)5	(2.5)5	(2.5)5	3.0	K	3.0	K	2.9	K	2.8	K	2.6	K	2.6	K	2.6	K	2.6	K
11	2.6	2.6	2.6	2.6	2.7	2.6	2.7	2.9	3.0	3.1	2.9	2.9	2.7	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	
12	(2.6)5	(2.6)5	(2.6)5	(2.6)5	(2.6)5	(2.6)5	(2.6)5	(2.6)5	2.4	K	2.5	K	2.4	K	2.4	K	2.4	K	2.5	K	2.6	K	2.5	K
13	2.3	K	2.6	K	(2.6)5	2.6	K	2.6	2.5	(2.6)5	3.0	2.9	(2.9)5	2.9	2.9	2.9	2.9	2.8	(2.8)5	(2.8)5	5	5	5	2.6
14	2.6	2.8	2.6	(2.6)5	(2.8)5	(2.8)5	(2.8)5	2.9	3.0	2.9	2.8	2.8	2.7	2.8	2.9	2.9	2.9	(2.9)5	(2.9)5	3.0	2.9	(2.7)5	(2.7)5	
15	(2.8)5	(2.7)5	2.9	2.7	2.7	2.7	2.7	3.1	3.0	(3.0)5	2.9	2.9	2.9	2.9	2.9	2.8	(2.8)5	(2.9)5	(2.9)5	(2.9)5	2.8	2.7	(2.7)5	
16	2.7	2.7	2.7	2.8	2.7	2.7	2.8	2.8	3.1	3.0	3.0	2.8	2.8	2.8	2.8	(2.9)5	2.9	(2.9)5	(3.0)5	(3.0)5	2.9	2.8	2.8	
17	2.5	2.6	2.7	2.6	2.6	2.6	2.6	2.6	3.0	3.2	2.9	2.9	2.7	2.9	2.8	2.8	2.8	2.8	2.9	(2.9)5	2.8	2.6	2.6	
18	2.6	2.8	2.8	2.8	2.8	2.8	2.8	3.1	3.0	3.1	2.9	2.8	2.8	2.7	2.7	2.7	2.7	(2.7)5	(2.8)5	2.7	2.7	2.7		
19	2.7	2.6	2.7	(2.6)5	2.6	2.6	2.6	2.9	2.9	(3.3)2	(2.9)5	(2.9)5	2.6	K	2.5									
20	2.5	K	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
21	2.6	2.7	2.6	2.6	2.7	2.7	2.7	3.0	3.0	3.0	2.9	2.8	2.7	2.7	2.7	2.6	2.7	2.7	2.8	(2.8)5	(2.8)5	2.8	2.6	
22	2.7	2.7	2.6	2.6	2.8	2.8	2.8	3.0	3.0	3.0	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	
23	(2.6)5	2.6	2.5	2.5	2.5	2.5	2.5	2.7	(2.8)5	2.8	2.9	2.7	2.7	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	
24	2.6	2.8	2.6	2.6	2.6	2.6	2.6	2.8	3.1	2.9	3.0	2.7	2.8	2.7	2.7	2.7	2.7	2.7	2.8	2.9	2.8	2.7	2.7	
25	2.7	2.6	2.7	2.7	2.7	2.7	2.7	2.6	2.8	3.0	3.0	2.9	2.7	2.8	2.7	2.7	2.7	(2.8)5	(2.8)5	(2.8)5	2.7	2.7	(2.7)5	
26	2.6	2.7	2.6	2.5	2.5	2.7	(2.6)5	2.9	(2.9)5	C	2.9	2.9	2.8	2.7	2.7	2.8	2.7	2.8	(3.0)5	3.1	3.0	2.9	(2.5)5	
27	2.5	2.5	(2.7)5	2.5	2.7	(2.7)5	2.8	2.8	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	(2.7)5	2.8	2.7	2.7	2.6	
28	2.6	(2.5)5	2.5	2.5	2.3	2.6	3.0	2.9	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	
29	2.6	2.6	2.6	2.7	2.7	2.8	3.1	2.9	3.0	2.8	2.8	2.7	2.8	2.6	2.5	C	2.8	(2.7)5	(2.8)5	2.6	2.8	(2.7)5		
30	2.9	2.9	2.6	2.7	2.7	(2.6)5	2.7	3.0	2.9	3.1	2.8	2.9	2.7	2.8	2.7	2.8	2.7	2.8	2.8	2.8	2.8	2.8	(3.0)5	
31																								

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual  Automatic

(M3000)FI  
(Chronometric)  
April 1949  
(Unit)

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.  
Observed at ...  
Lat 39.0°N, Long 77.5°W

TABLE 42  
IONOSPHERIC DATA

National Bureau of Standards  
Searched by E. J. W., J. J. S., J. M. C.  
Consulted by J. J. S., L. H., G. P. G.

Day	75°W												Mean Time													
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1									Q	Q	L	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
2									C	C	Q	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
3									Q	Q	L	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
4									Q	Q	L	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
5									Q	Q	Q	Q	L	L	L	L	L	L	L	L	L	L	L	L		
6									Q	Q	Q	Q	Q	41	38	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	
7									L	Q	Q	Q	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
8									34	K	C	K	41	K	35	K	35	K	34	K	34	K	34	K	32	K
9									Q	L	L	Q	L	L	L	Q	L	Q	L	Q	L	Q	Q	Q	Q	
10									Q	K	45	K	39	K	41	K	33	K	32	K	32	K	32	K	32	K
11									Q	L	39	H	L	L	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
12									Q	K	31	K	32	K	35	K	34	K	34	K	32	K	32	K	32	K
13									Q	L	Q	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
14									Q	L	L	L	Q	L	L	Q	L	Q	L	Q	L	Q	L	Q	B	
15									L	L	L	L	L	L	L	Q	L	Q	L	Q	L	Q	L	Q	L	
16									Q	Q	40	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
17									Q	38	L	L	L	35	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
18									Q	Q	34	36	34	36	34	38	35	Q	Q	Q	Q	Q	Q	Q	Q	
19									3.4	K	35	K	35	K	34	K	36	K	34	K	34	K	32	K	32	K
20									C	L	L	42	L	35	L	35	L	L	Q	L	Q	L	Q	L	Q	
21									L	Q	L	Q	L	L	L	L	L	L	Q	L	Q	L	Q	L	Q	
22									Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
23									Q	L	34	33	33	33	33	33	31	29	Q	Q	Q	Q	Q	Q	Q	
24									Q	Q	Q	34	L	L	L	33	L	Q	Q	Q	Q	Q	Q	Q	Q	
25									Q	Q	(36) <sup>3</sup>	L	L	33	L	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
26									Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
27									Q	L	31	35	33	33	40	34	L	Q	Q	Q	Q	Q	Q	Q	Q	
28									Q	L	A	33	36	L	C	C	C	C	C	C	C	C	C	C	C	
29									Q	Q	36	L	33	L	L	L	L	L	L	L	L	L	L	L	L	
30									-	38	36	36	34	34	34	34	34	34	34	34	34	34	34	34	34	
31									2	S	10	10	12	12	12	12	8	8	8	8	8	8	8	8	8	

Sweep 1.0 Mc to 25.0 Mc in 0.25 min  
Manual  Automatic

Form 50-2045 June 546

**TABLE 43**  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.  
**IONOSPHERIC DATA**

National Bureau of Standards

(Institution)

Scaled by E.J.W., J.J.S., J.M.C.

Calculated by J.J.S., L.H., G.P.G.

(M1500E) (Unit)  
(Characteristic)April, 1949  
(Month)

Washington, D.C.

Observed at Lat. 39.0°N., Long. 77.5°W.

Day	75°W Mean Time																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
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27																									
28																									
29																									
30																									
31																									
	Mean																								
	Count																								
	20	28	26	28	25	24	22	25	27	28	26	21	22	23	24	25	26	27	28	29	26	27	28	29	

Sweep 1.0 Mc to 25.0 Mc in 0.25 min  
Manual  Automatic

Table 44

Ionospheric Storminess at Washington, D. C.

April 1949

Day	Ionospheric character*		Principal storms		Geomagnetic character**	
	00-12 GCT	12-24 GCT	Beginning GCT	End GCT	00-12 GCT	12-24 GCT
1	1	1			1	2
2	1	2			1	1
3	1	1			2	2
4	1	3			2	1
5	1	1			1	2
6	1	1			2	1
7	0	1			1	4
8	7	8	0100	----	6	4
9	4	2	----	1000	2	2
10	3	4	1100	2000	4	4
11	2	1			4	4
12	3	6	0700	----	3	4
13	4	2	----	0900	4	3
14	2	2			4	2
15	1	2			3	2
16	1	3			3	3
17	2	2			3	2
18	1	1			2	1
19	2	5	1100	----	2	1
20	***	1	----	----#	1	1
21	2	2			2	2
22	1	3			1	1
23	2	2			1	1
24	2	0			2	2
25	1	1			2	1
26	2	3			2	2
27	2	1			3	1
28	2	1			2	2
29	2	1			1	2
30	1	3			1	1

\*Ionosphere character figure (I-figure) for ionospheric storminess at Washington, D. C., during 12-hour period, on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

\*\*Average for 12 hours of Cheltenham, Maryland, geomagnetic K-figures on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

\*\*\*No readable record. Refer to table 33 for detailed explanation.

----Dashes indicate continuing storm.

#Time of ending unknown because of loss of record.

Table 45Sudden Ionosphere Disturbances Observed at Washington, D. C.April 1949

1949 Day	GCT		Location of transmitters	Relative intensity at minimum*	Other phenomena	
	Beginning	End				
April	5	0953	1018	England	0.03	Solar flare** 1350
	5	1020	1045	England	0.05	
	5	1522	1545	Ohio, D.C., England	0.03	
	5	1622	1710	Ohio, D.C., England, New Brunswick	0.0	
	10	2058	2245	Ohio, D.C., England	0.0	
	19	2050	2120	Ohio, D.C.	0.1	
	20	1339	1415	D.C., England	0.3	
	21	1212	1315	England	0.1	
	25	2059	2135	Ohio, D.C.	0.2	
	27	1755	1805	Ohio, D.C.	0.2	
	27	2143	2200	Ohio, D.C., New Brunswick	0.05	
	28	1753	1810	Ohio, D.C.	0.2	
	29	1640	1800	Ohio, D.C., England New Brunswick	0.1	

\*Ratio of received field intensity during SID to average field intensity before and after, for station W8XAL, 6080 kilocycles, 600 kilometers distant, for all SID except the following: Station GLH, 13525 kilocycles, received in New York, 5340 kilometers distant, was used for the SID on April 5 at 0953 and at 1020, on April 20, and on April 21.

\*\*Time of observation at McMath-Hulbert Observatory, Michigan.

Sudden Ionosphere Disturbances Reported by Engineer-in-Chief, Cable and Wireless, Ltd., as Observed in England

1949 Day	GCT Beginning End	Receiving station	Location of transmitters	Other phenomena	1949 Day	GCT Beginning End	Receiving station	Location of transmitters	Other phenomena
March 21	0750 0820	Brentwood	Bahrein I., Belgian Congo, French Equatorial Africa, Greece, India, Iran, Kenya, Madagascar, Palestine, Syria, Trans-Jordan, U.S.S.R., Yugoslavia		5	0955 1025	Somerton	Aden, Argentina, Ascension I., Australia, Brazil, Ceylon, China, Egypt, Gold Coast, India, Union of S. Africa	
21	0748 0810	Somerton	Aden, Ascension I., Ceylon, China, India, Kenya, Palestine, Southern Rhodesia		5	1028 1055	Brentwood	Afghanistan, Austria, Belgian Congo, Bulgaria, Canary Is., Greece, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Trans-Jordan, Turkey, U.S.S.R., Zanzibar	
25	0640 0710	Brentwood	Austria, Bahrain I., Belgian Congo, Canary Is., Chile, Eritrea, Greece, India, Iran, Malta, Palestine, Portugal, Spain, Switzerland, Syria, Thailand, Turkey, U.S.S.R., Venezuela, Yugoslavia, Zanzibar	Solar flare*	5	1025 1050	Somerton	Aden, Ascension I., Argentina, Australia, Brazil, Ceylon, China, Egypt, Gold Coast, India, Union of S. Africa	
26	1420 1445	Brentwood	Austria, Bahrain I., Belgian Congo, Canary Is., Chile, Eritrea, Greece, India, Iran, Malta, Palestine, Portugal, Spain, Switzerland, Syria, Thailand, Turkey, U.S.S.R., Venezuela, Yugoslavia, Zanzibar	Solar flare**	5	1520 1545	Brentwood	Colombia, Uruguay, Venezuela	
26	1420 1440	Somerton	Auden, Argentina, Ascension I., Australia, Barbados, Brazil, Canada, Ceylon, China, Egypt, Gold Coast, India, New York, Union of S. Africa	Solar flare*	5	1640 1725	Brentwood	Barbados, Chile, Colombia, Uruguay, Venezuela	
28	0948 1005	Brentwood	Afghanistan, Austria, Bahrain I., Belgian Congo, Canary Is., Greece, India, Kenya, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, Trans-Jordan, U.S.S.R., Yugoslavia, Zanzibar	Solar flare**	10	0607 0625	Brentwood	Argentina, Brazil, Canada, New York	
28	0945 1015	Somerton	Auden, Ascension I., Ceylon, India, Union of S. Africa	Solar flare**	11	1101 1130	Brentwood	Belgian Congo, Greece, India, Palestine, Trans-Jordan, Zanzibar	
29	0555 0610	Brentwood	Afghanistan, Greece, India, Iran, Kenya, Southern Rhodesia, Syria, U.S.S.R.		13	0802 0825	Brentwood	Solar flare**	
30	0645 0710	Brentwood	Afghanistan, Bahrain I., India, Syria		13	0805 0825	Somerton	Austria, Bahrain I., Belgium, Congo, Greece, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Trans-Jordan, Yugoslavia, Zanzibar	
31	1730 1810	Brentwood	Chile, Colombia, Uruguay, Venezuela		13	1157 1215	Brentwood	Austria, Belgian Congo, Brazil, Ceylon, China, Egypt, Gold Coast, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Trans-Jordan, Turkey, Yugoslavia, Zanzibar	
31	1740 1755	Somerton	Argentina, Barbados, Brazil, Canada, New York						
April 5	0957 ***	Brentwood	Afghanistan, Austria, Bahrain I., Belgian Congo, Bulgaria, Canary Is., Greece, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, Trans-Jordan, Turkey, U.S.S.R., Yugoslavia, Zanzibar						

\*Time of observation at Prague Observatory, Czechoslovakia.

\*\*Time of observation at Meudon Observatory, France.

\*\*\*Incomplete recovery of SID.

Table 47

Sudden Ionosphere Disturbances Reported by Chinese Government Radio Administration  
as Observed at Shanghai, China

1949 Day	GCT		Location of transmitters	Other phenomena
	Beginning	End		
January 15	0420	0440	Australia, California, French Indo-China, India, Philippine Is., Soviet Union in Asia, Thailand	
	16	0530	Australia, French Indo-China, India, Thailand	
	23	0110	**	
	25	0254	0310	Australia, California, French Indo-China, India, Philippine Is., Soviet Union in Asia, Thailand
February 10	0230	0250	California, French Indo-China, India, Philippine Is., Soviet Union of Asia, Thailand	
	11	1105	1120	Argentina, India
	18	0225	0250	Argentina, Australia, California, French Indo-China, India, Philippine Is., Soviet Union in Asia, Thailand
March 21	0750	0820	Australia, California, India, Thailand	Solar flare* 1100

\*Time of observation at Meudon Observatory, France.

\*\*Time not reported.

Table 48

Sudden Ionosphere Disturbances Reported by RCA Communications, Inc.  
as Observed at Point Reyes, California

1949 Day	GCT		Location of transmitters
	Beginning	End	
April 6	0030	0100	Australia, China, Hawaii, Japan, Java, Philippine Is.
10-11	2106	0030	Australia, China, Hawaii, Japan, Philippine Is.
28	0440	0530	China, Chosen, Japan, Philippine Is.

Note: Observers are invited to send to the CRPL information on times of beginning and end of sudden ionosphere disturbances for publication as above. Address letters to the Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Table 40

Provisional Radio Propagation Quality Figures  
 (Including Comparisons with CRPL Warnings and CRPL Probable Disturbed Period Forecasts)  
March 1949

Day	North Atlantic						North Pacific					
	Quality figure	CRPL* Warning	CRPL Forecast of probable disturbed periods	Geo-magnetic K <sub>Ch</sub>	Quality figure	CRPL* Warning	CRPL Forecast of probable disturbed periods	Geo-magnetic K <sub>Ch</sub>	01-12 00T 13-24 00T	01-12 00T 13-24 00T	01-12 00T 13-24 00T	01-12 00T 13-24 00T
	01-12 00T 13-24 00T	01-12 00T 13-24 00T			01-12 00T 13-24 00T	01-12 00T 13-24 00T			01-12 00T 13-24 00T	01-12 00T 13-24 00T		01-12 00T 13-24 00T
1	6	6		2 3	6	6						2 3
2	5	6	X	4 2	5	6		X				4 2
3	5	6	X	4 3	5	5		X				4 3
4	5	6		2 2	5	7						2 2
5	6	7	X	3 1	5	6		X				3 1
6	7	6	X	1 1	6	7		X				1 1
7	7	6		1 1	5	7						1 1
8	7	7		1 2	6	7						1 2
9	7	6		2 3	6	6						2 3
10	7	6		0 1	6	6						0 1
11	7	7		1 1	6	7						1 1
12	6	7		1 2	6	6						1 2
13	6	6		3 4	6	6						3 4
14	(4) 5	X		5 3	7	6	X					5 3
15	5	6	X	4 2	7	6	X					4 2
16	6	6		2 4	7	7						2 4
17	6	6	X	3 4	7	5	X					3 4
18	(4) 5			4 3	6	5						4 3
19	6	6		3 3	7	7						3 3
20	6	7	X	2 2	7	6		X				2 2
21	6	5	X	3 3	6	6		X				3 3
22	(3)(4)	X X	X	6 4	5	5	X X					6 4
23	(4) 5	X X	X	5 2	5	6	X X					5 2
24	5	6		2 2	6	7						2 2
25	6	6		2 2	6	6						2 2
26	6	6		4 1	5	5						4 1
27	7	6		0 1	6	6						0 1
28	7	7		3 3	6	6						3 3
29	6	7		3 2	5	7						3 2
30	6	7		3 1	6	6						3 1
31	7	6		2 1	6	7						2 1

## Score:

H

2

2

0

0

M

2

2

0

0

G

25

21

26

23

(S)

1

3

2

5

S

1

3

3

3

Quality Figure Scale:

- 1 - Useless
- 2 - Very poor
- 3 - Poor
- 4 - Poor to fair
- 5 - Fair
- 6 - Fair to good
- 7 - Good
- 8 - Very good
- 9 - Excellent

Symbols:

- X Warning given or probable disturbed date
- H Quality 4 or worse on day or half day of warning
- M Quality 4 or worse on day or half day of no warning
- G Quality 5 or better on day of no warning
- (S) Quality 5 on day of warning
- S Quality 6 or better on day of warning
- ( ) Quality 4 or worse (disturbed)

Geomagnetic K<sub>Ch</sub> on the standard scale of 0 to 9, 9 representing the greatest disturbance.

\*Broadcast on WWV, Washington, D.C. Times of warnings recorded to nearest half day as broadcast.

Table 50a

### Coronal observations at Climax, Colorado (5303A), east limb

Table 5la

Coronal observations at Climax, Colorado (6374A), east limb

Table 52a

Coronal observations at Climax, Colorado (6704A), east limb

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Coronal Observations at Climax Color (52303A)

Date GCT	Degrees south of the solar equator															Degrees north of the solar equator																				
	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5	0°	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1949	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
Apr. 4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
7.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
9.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
11.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
12.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
19.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
21.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
22.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
23.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
24.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
25.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
26.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
27.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
28.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
29.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4
30.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	22	24	23	20	15	14	14	11	9	6	4	4	4	4	4	4	4

Table 51b

## General observations at Climax, Colorado

Table 20

Table 53

American and Zürich Provisional Relative Sunspot NumbersApril 1949

Date	R <sub>A</sub> *	R <sub>Z</sub> **	Date	R <sub>A</sub> *	R <sub>Z</sub> **
1	175	149	17	189	175
2	201	158	18	188	164
3	210	155	19	181	168
4	240	178	20	199	165
5	217	176	21	221	162
6	211	147	22	226	155
7	201	149	23	206	177
8	199	151	24	202	181
9	170	144	25	215	171
10	164	139	26	186	121
11	163	104	27	198	110
12	184	128	28	169	122
13	174	138	29	156	116
14	190	151	30	136	81
15	181	164			
16	169	138	Mean:		190.7 148.9

\*Combination of reports from 45 observers; see page 8.

\*\*Dependent on observations at Zürich Observatory and its stations at Locarno and Arosa.

## GRAPHS OF IONOSPHERIC DATA

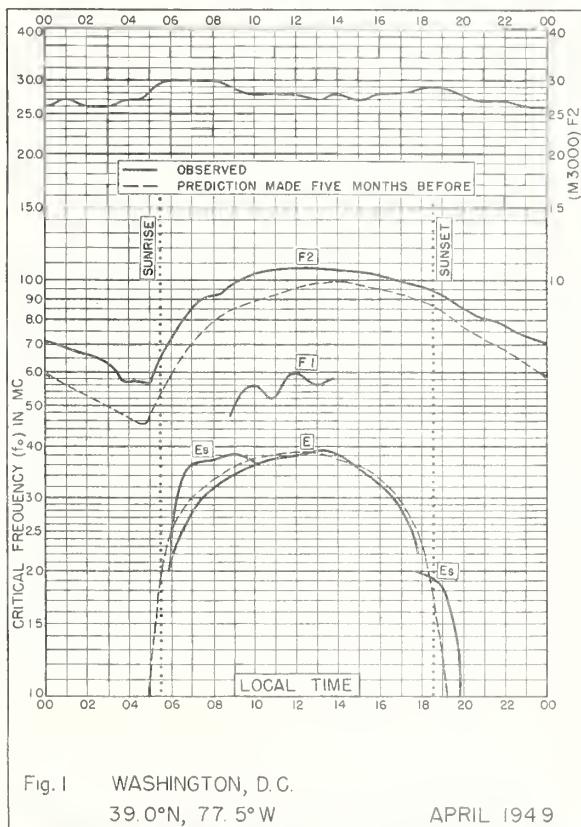


Fig. 1 WASHINGTON, D.C.  
39.0°N, 77.5°W APRIL 1949

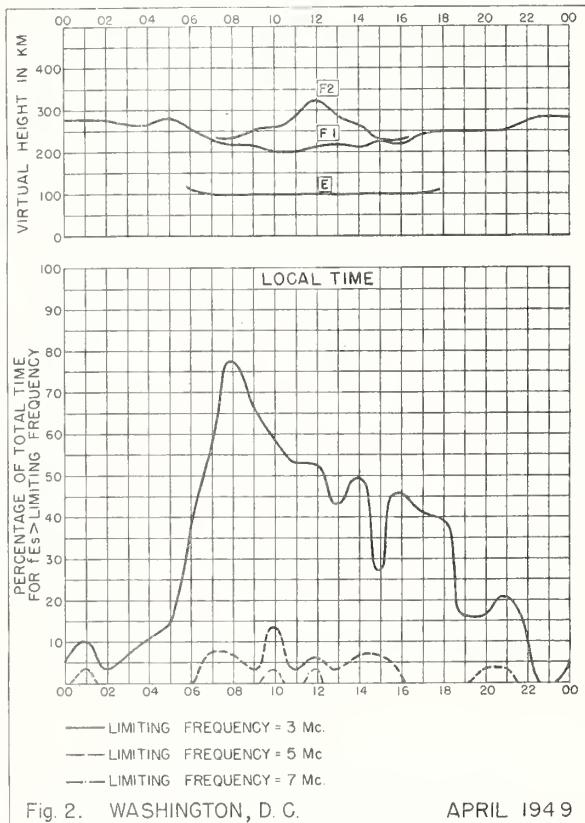


Fig. 2. WASHINGTON, D.C. APRIL 1949

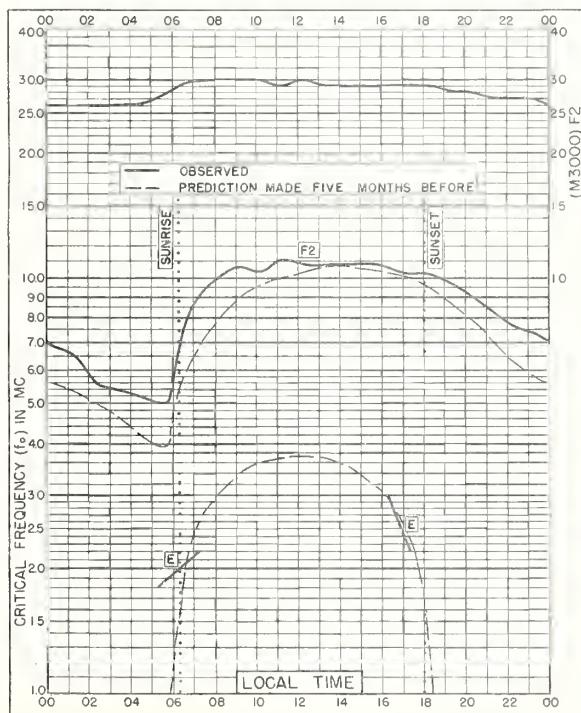


Fig. 3. BOSTON, MASSACHUSETTS  
42.4°N, 71.2°W MARCH 1949

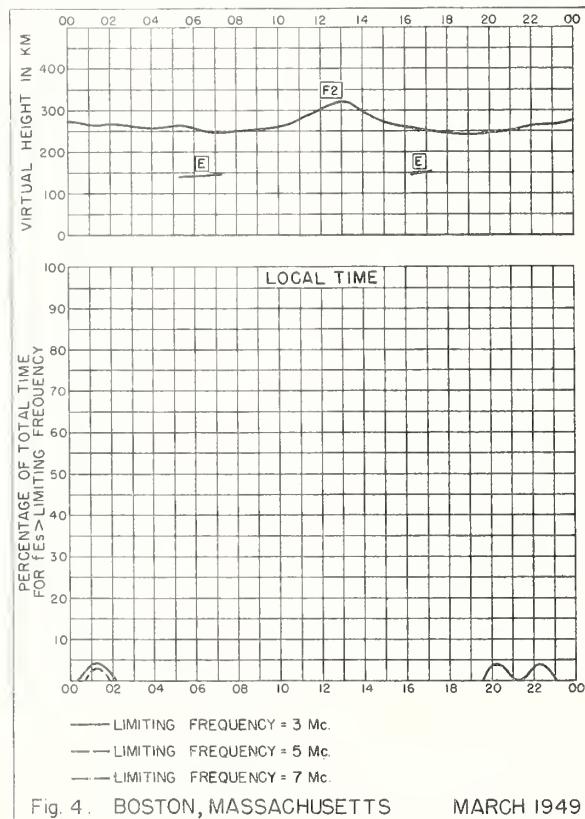


Fig. 4. BOSTON, MASSACHUSETTS MARCH 1949

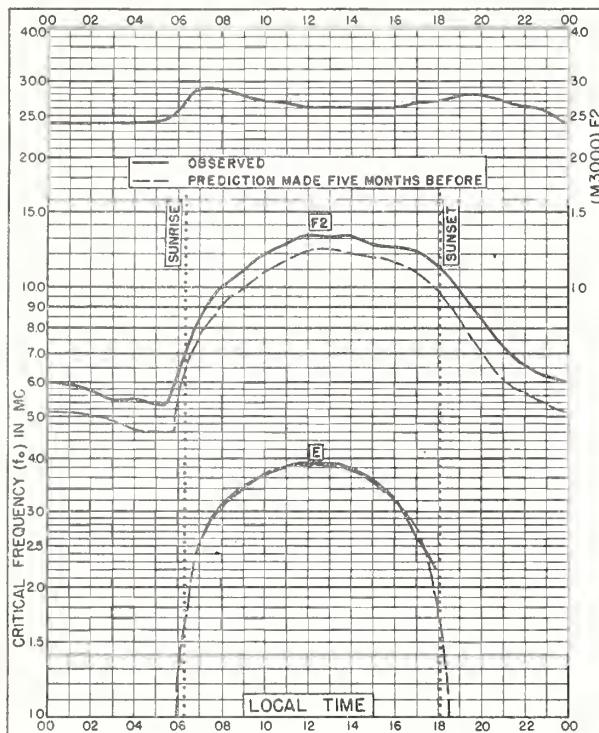


Fig. 5. SAN FRANCISCO, CALIFORNIA  
 37.4°N, 122.2°W MARCH 1949

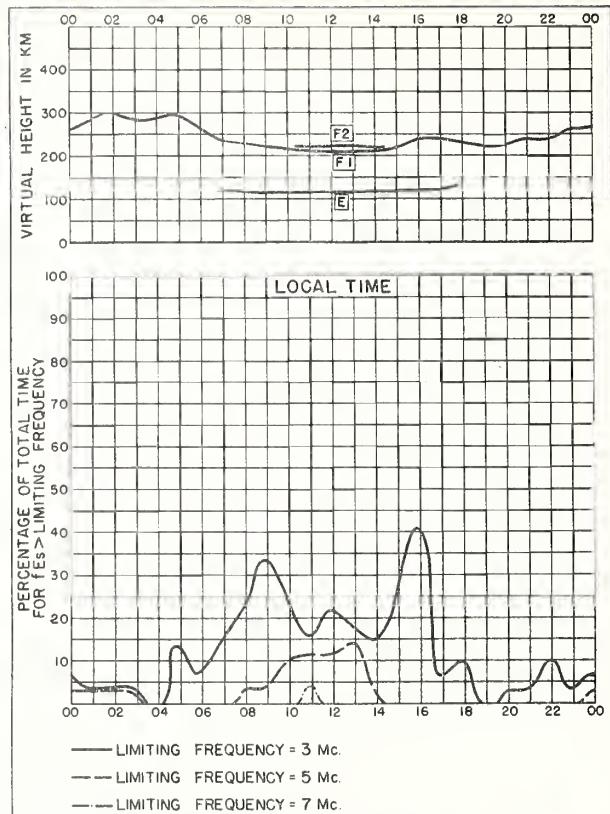


Fig. 6. SAN FRANCISCO, CALIFORNIA MARCH 1949

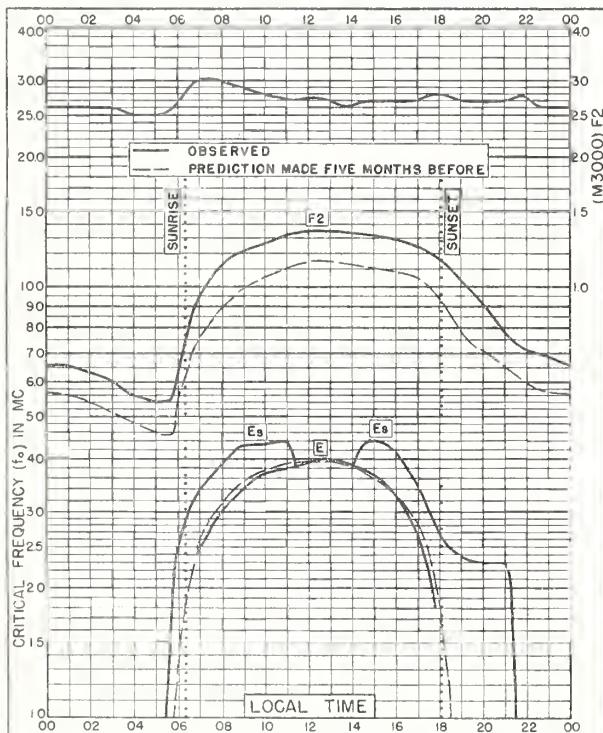
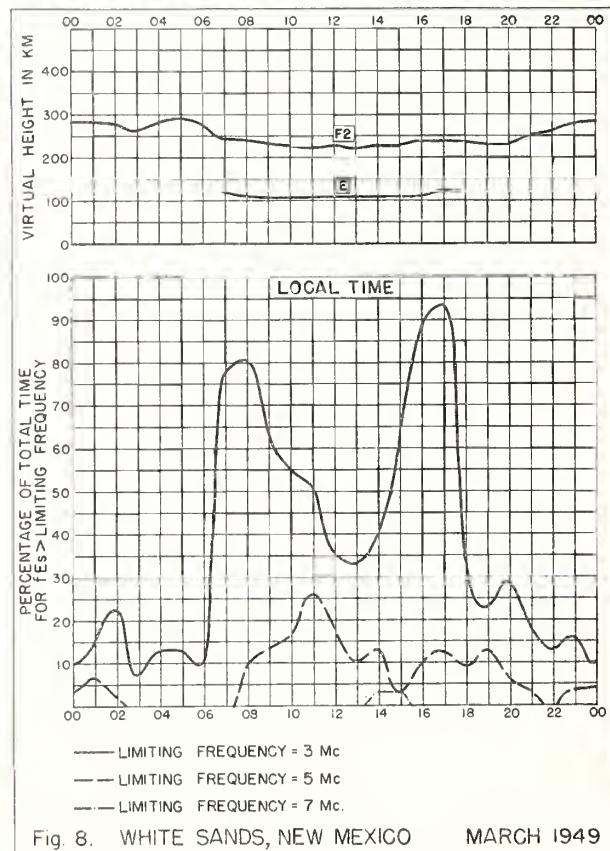


Fig. 7. WHITE SANDS, NEW MEXICO  
 32.3°N, 106.5°W MARCH 1949



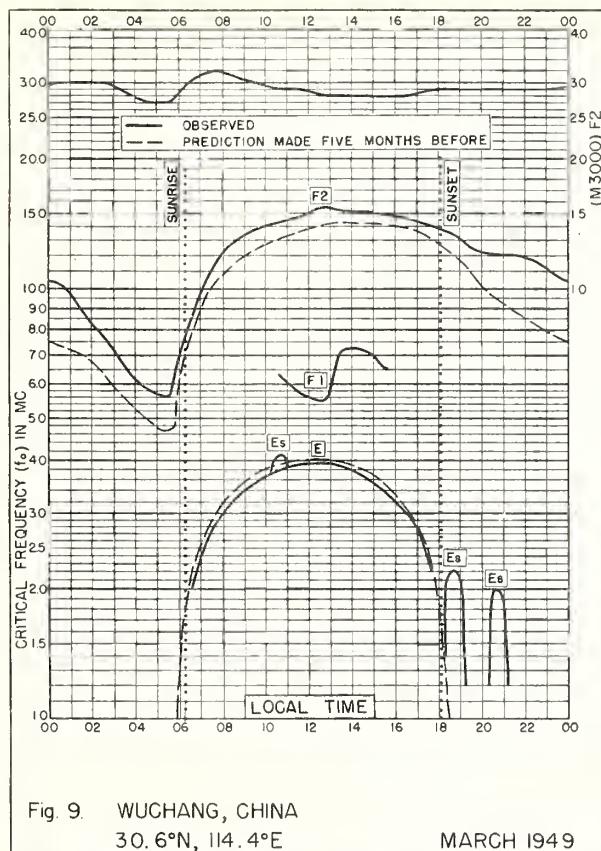


Fig. 9. WUCHANG, CHINA  
30.6°N, 114.4°E MARCH 1949

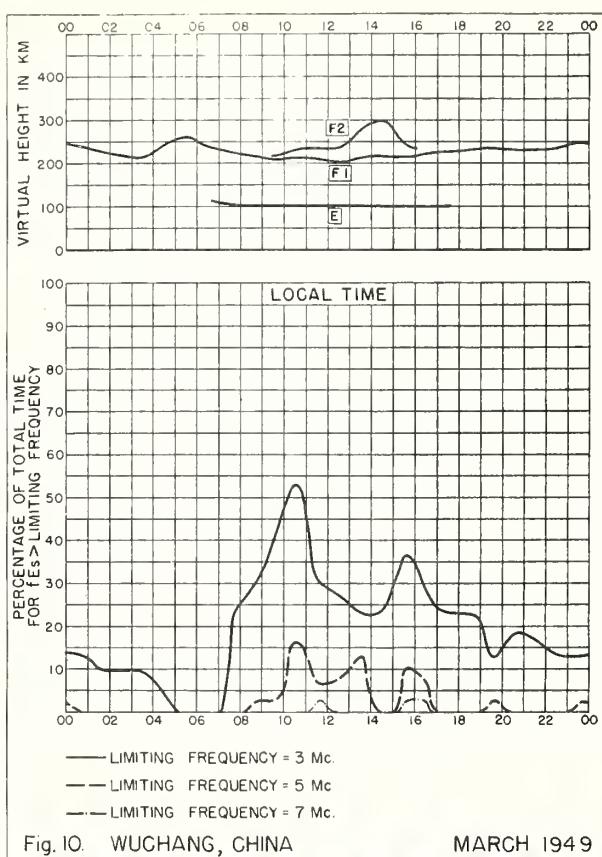


Fig. 10. WUCHANG, CHINA MARCH 1949

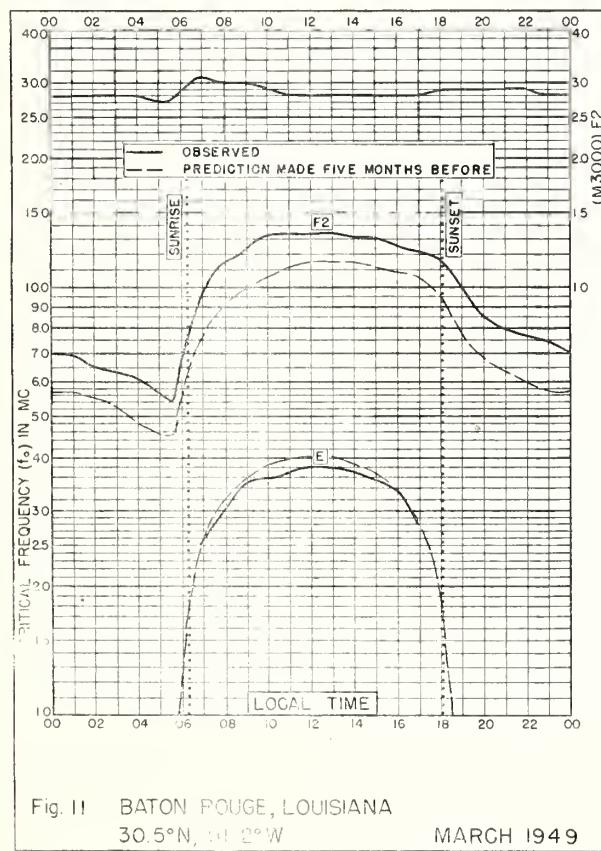


Fig. II BATON ROUGE, LOUISIANA  
 30.5°N, 91.2°W MARCH 1949

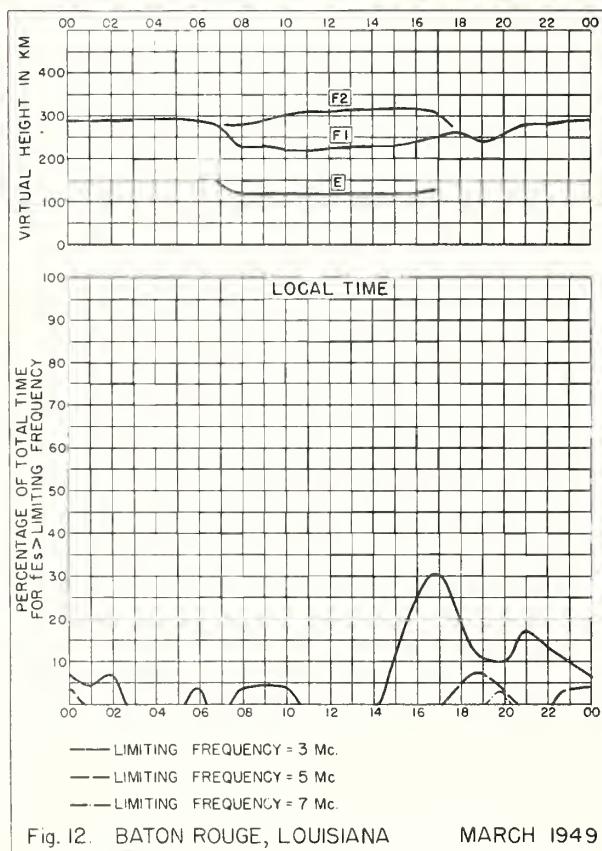


Fig. 12. BATON ROUGE, LOUISIANA MARCH 1949

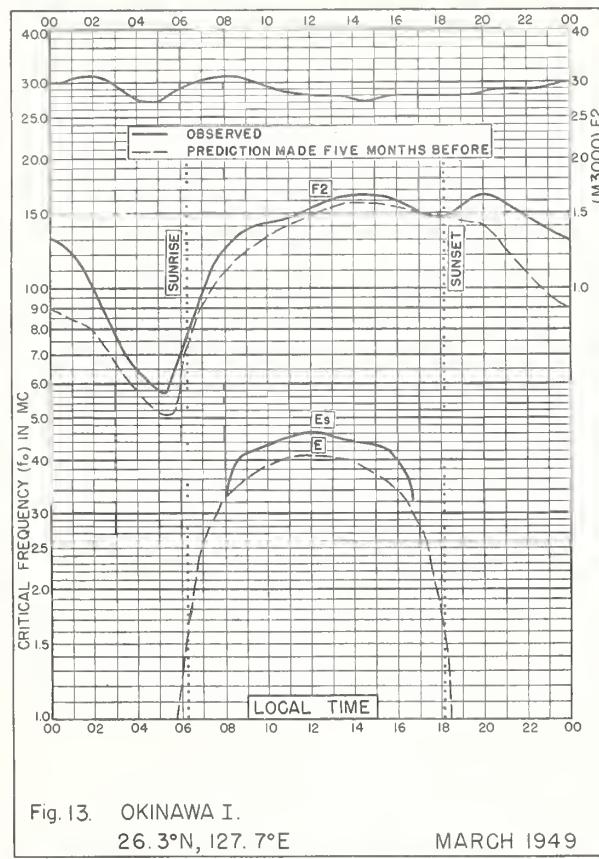


Fig. 13. OKINAWA I.  
26.3°N, 127.7°E MARCH 1949

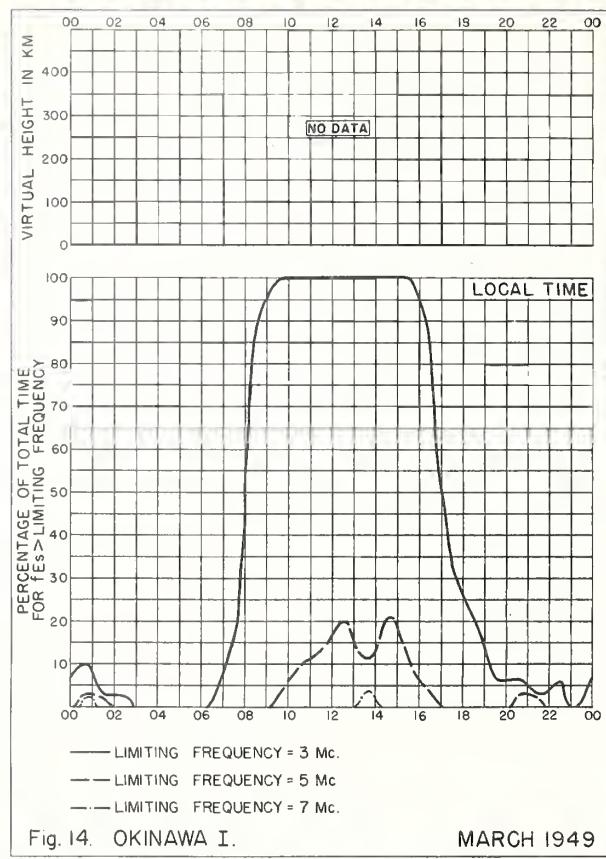


Fig. 14. OKINAWA I. MARCH 1949

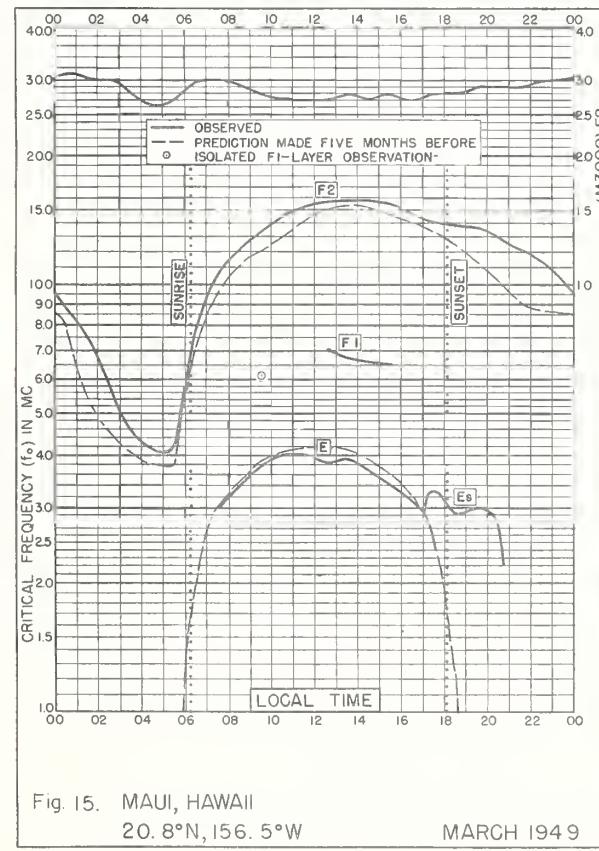


Fig. 15. MAUI, HAWAII  
20.8°N, 156.5°W MARCH 1949

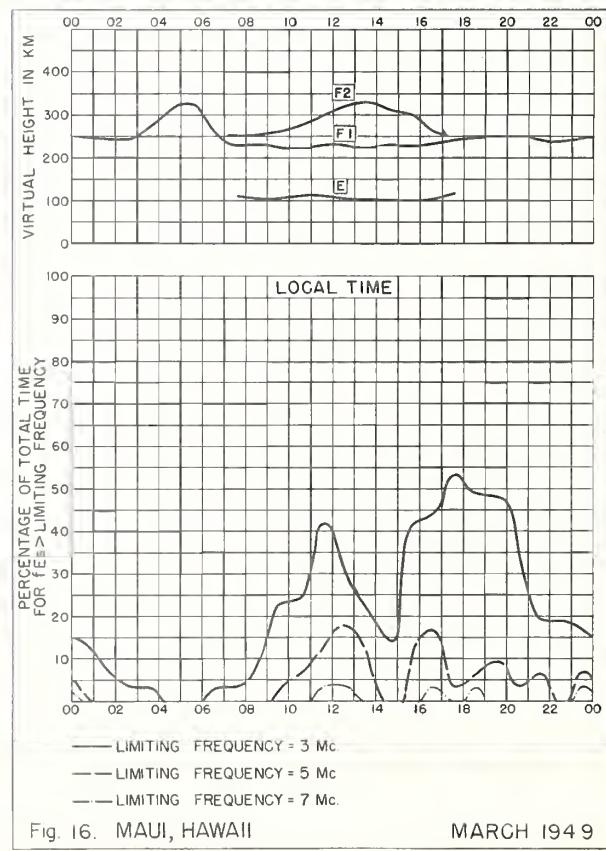


Fig. 16. MAUI, HAWAII MARCH 1949

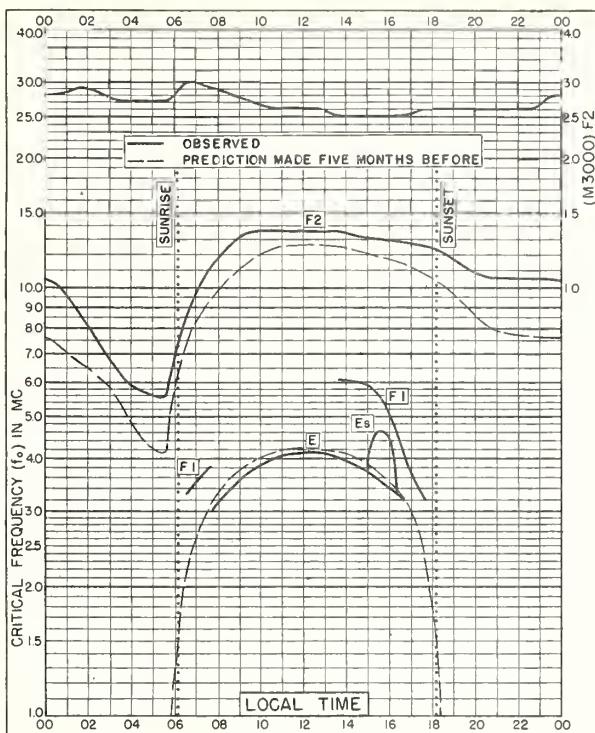


Fig. 17. SAN JUAN PUERTO RICO  
18.4°N, 66.1°W MARCH 1949

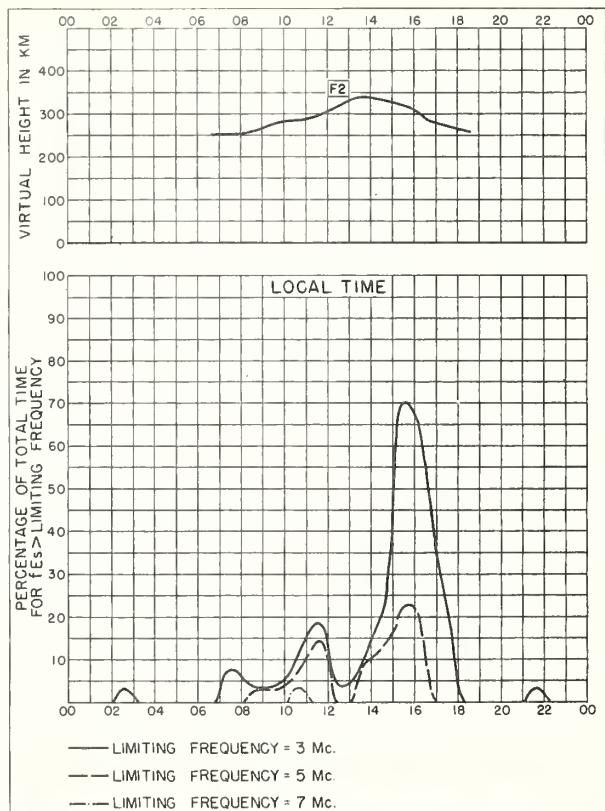


Fig. 18. SAN JUAN, PUERTO RICO MARCH 1949

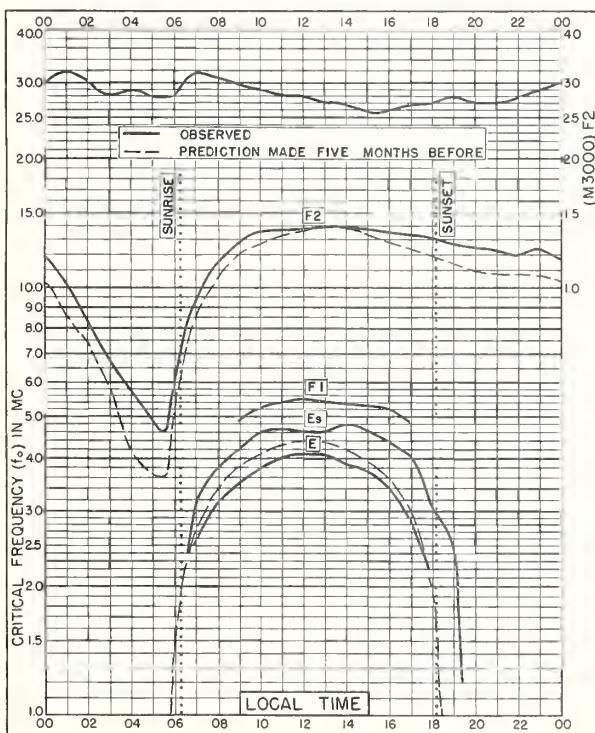


Fig. 19. TRINIDAD, BRIT. WEST INDIES  
10.6°N, 61.2°W MARCH 1949

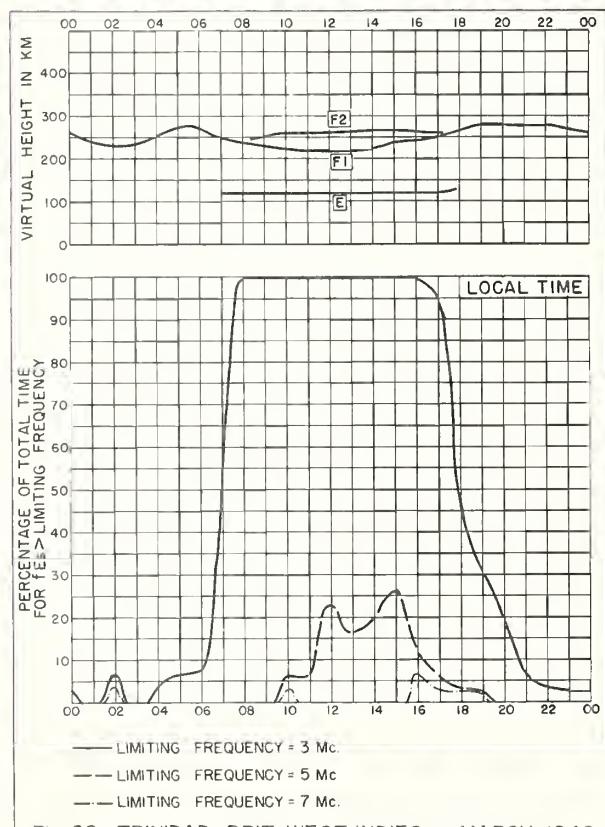


Fig. 20. TRINIDAD, BRIT. WEST INDIES MARCH 1949

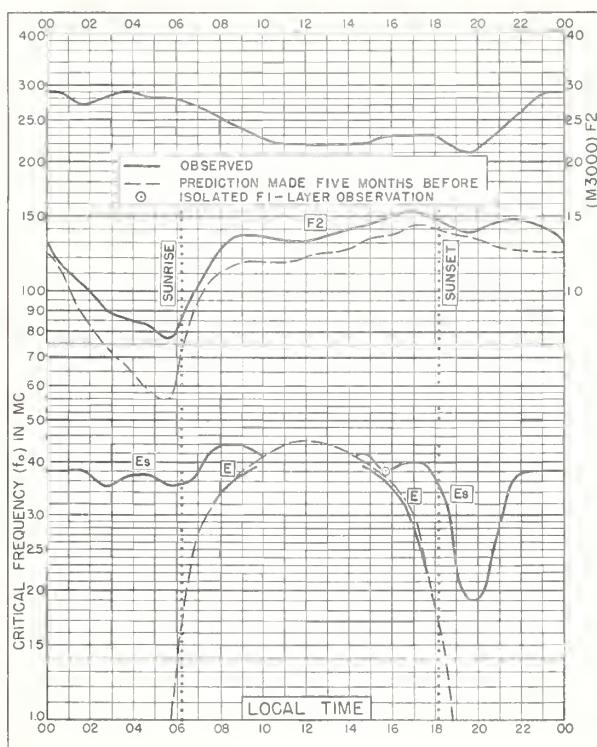


Fig. 21. PALMYRA I.

5.9°N, 162.1°W

MARCH 1949

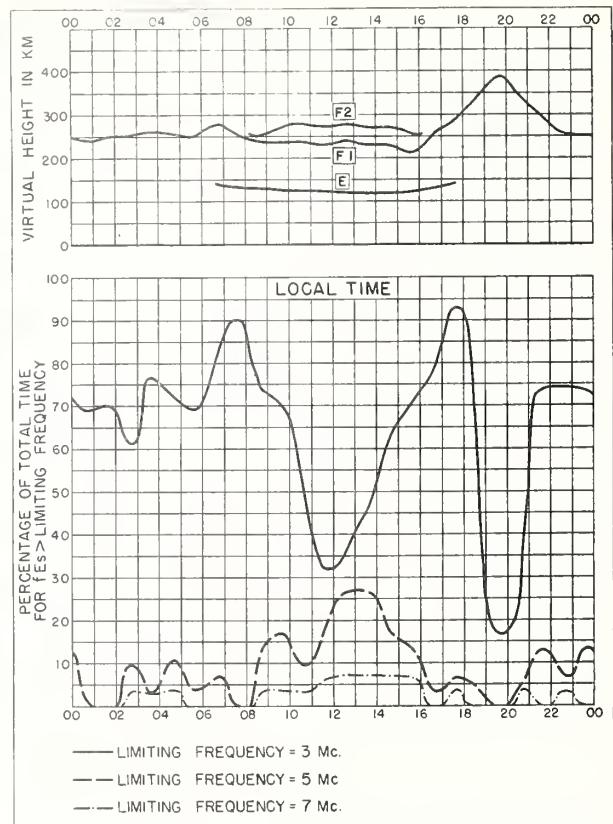


Fig. 22. PALMYRA I.

MARCH 1949

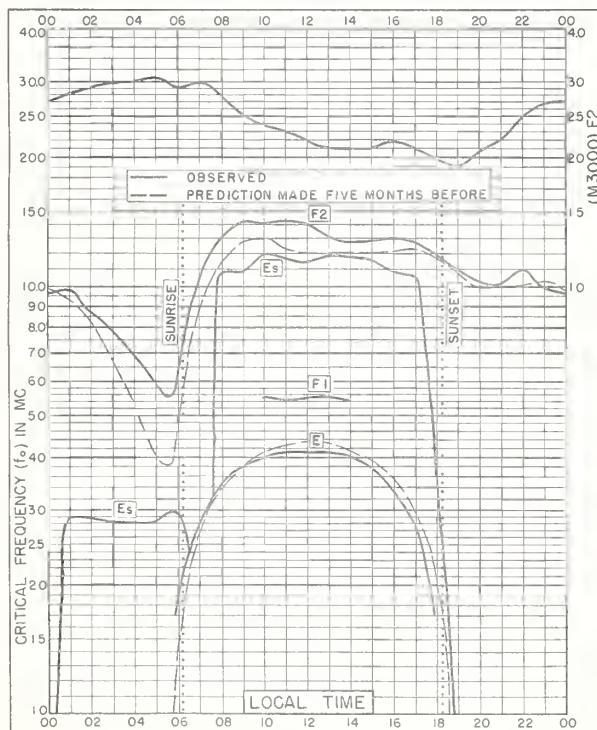


Fig. 23. HUANCAYO, PERU

12.0°S, 75.3°W

MARCH 1949

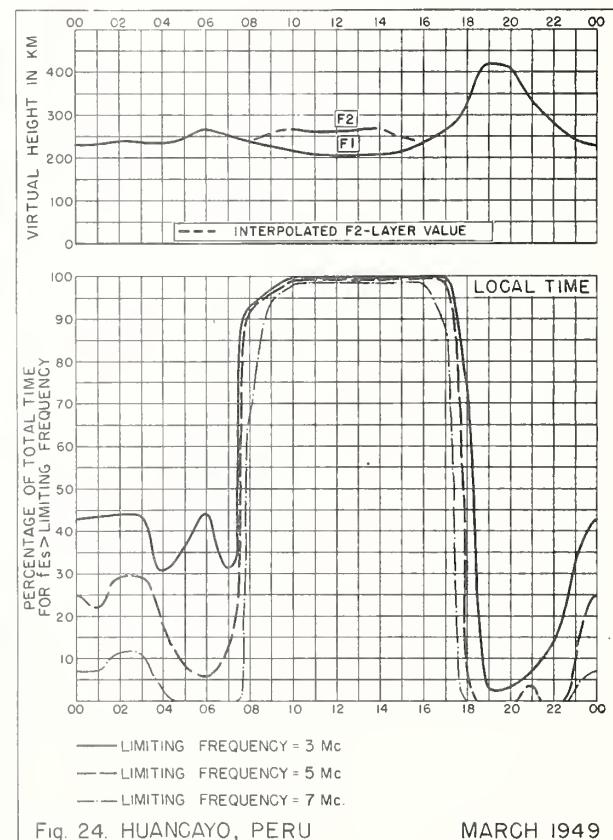
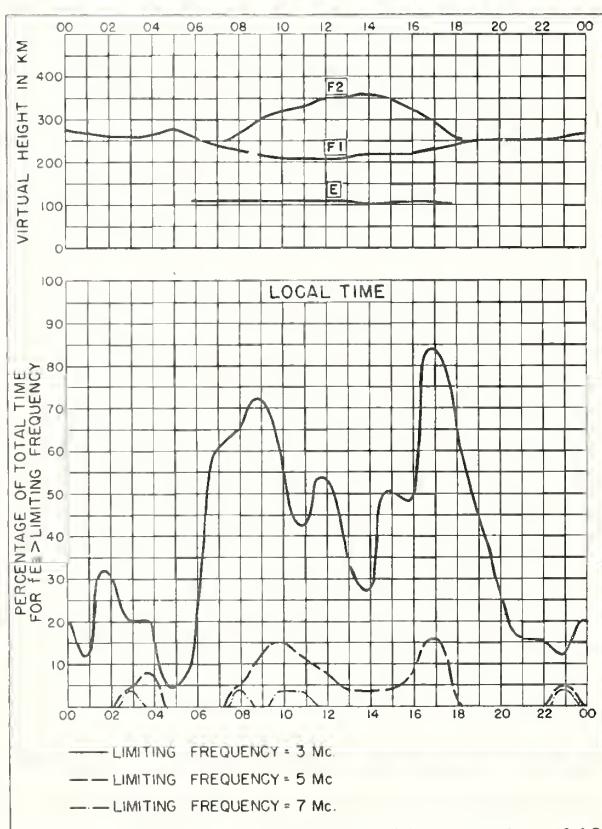
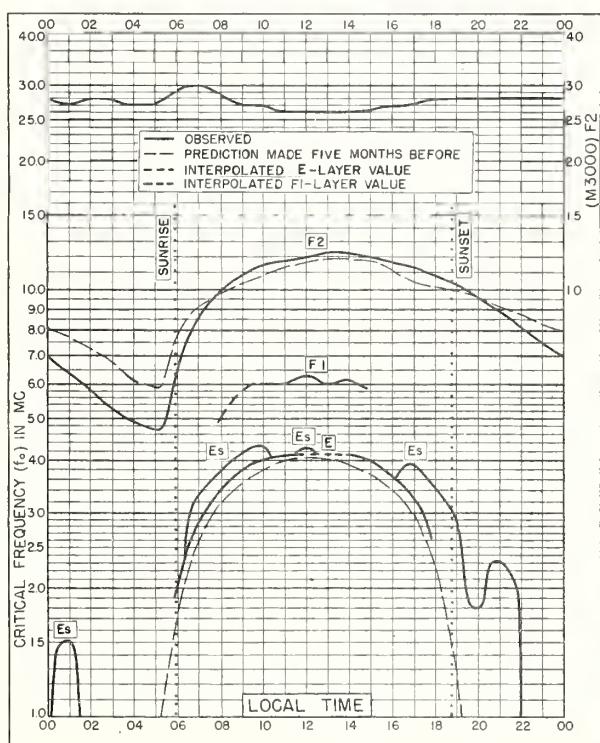
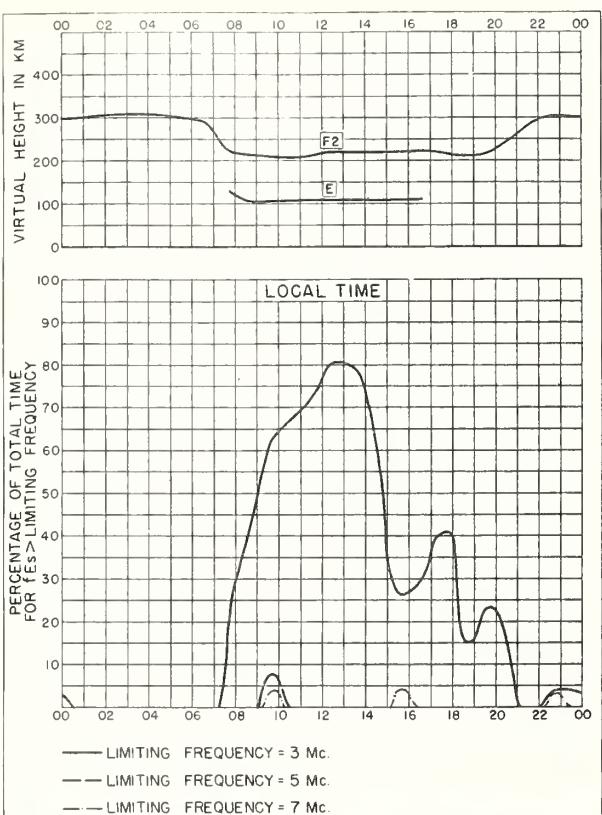
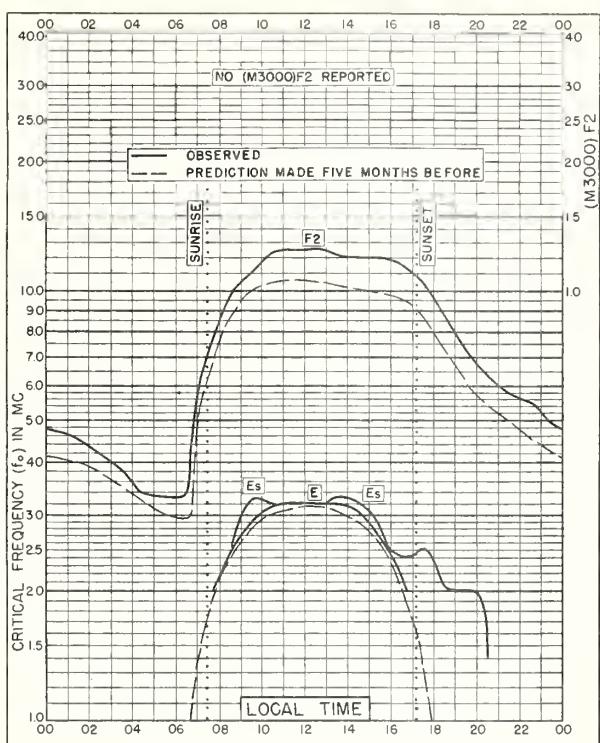


Fig. 24. HUANCAYO, PERU

MARCH 1949



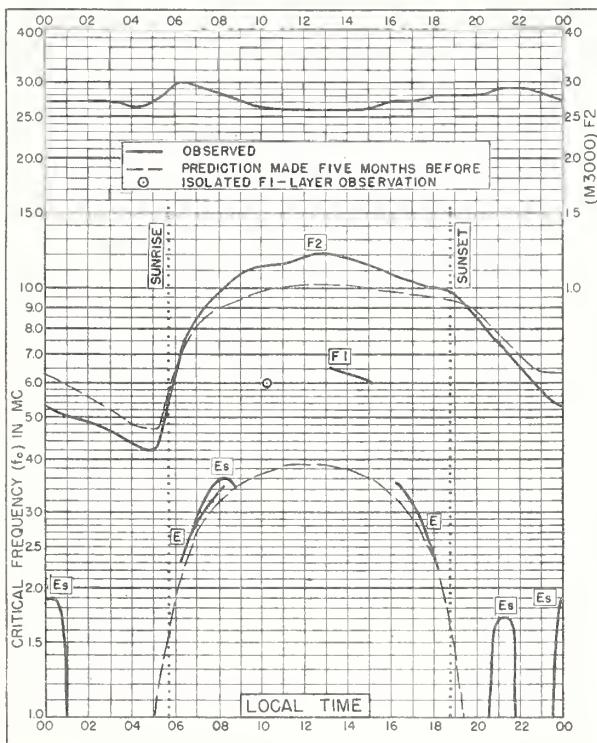


Fig. 29. CAPETOWN, U. OF S. AFRICA  
34. 2°S, 18. 3°E FEBRUARY 1949

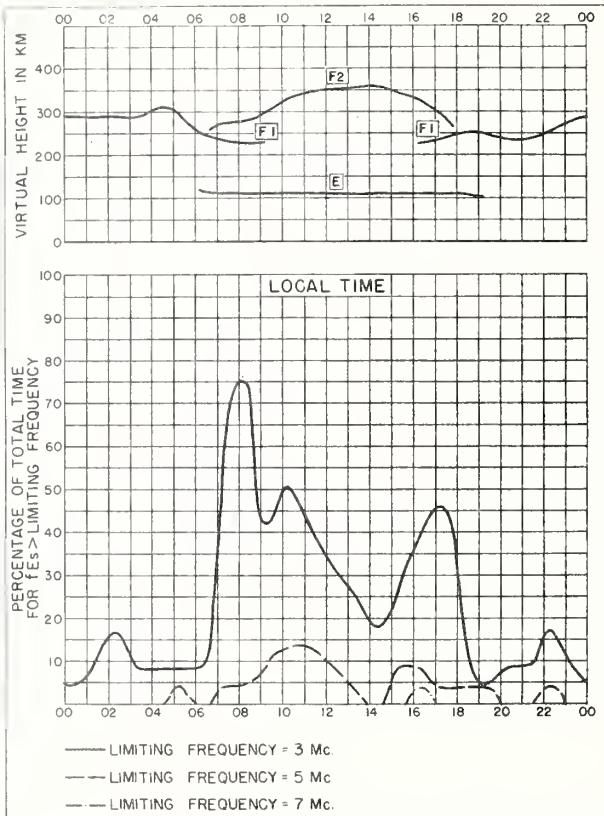


Fig. 30. CAPETOWN, U. OF S. AFRICA FEBRUARY 1949

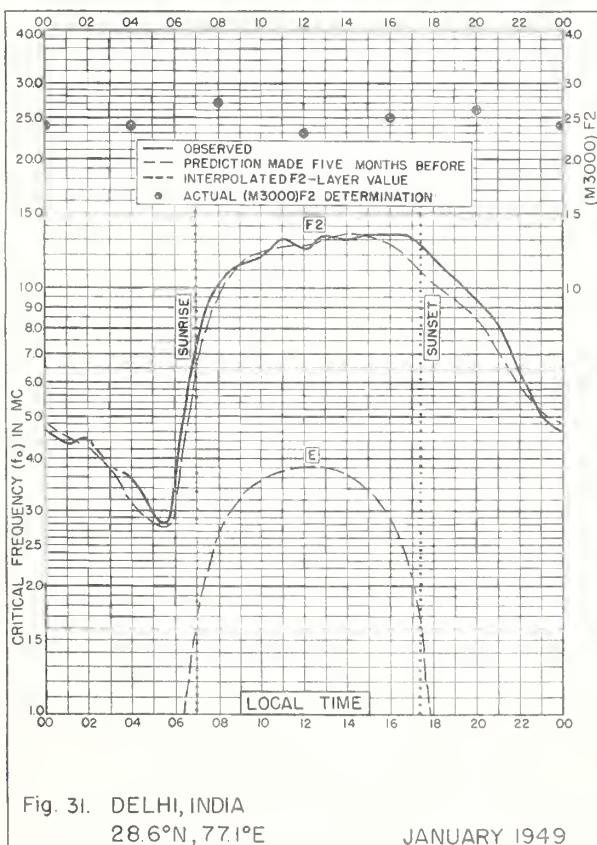


Fig. 31. DELHI, INDIA  
28.6°N, 77.1°E JANUARY 1949

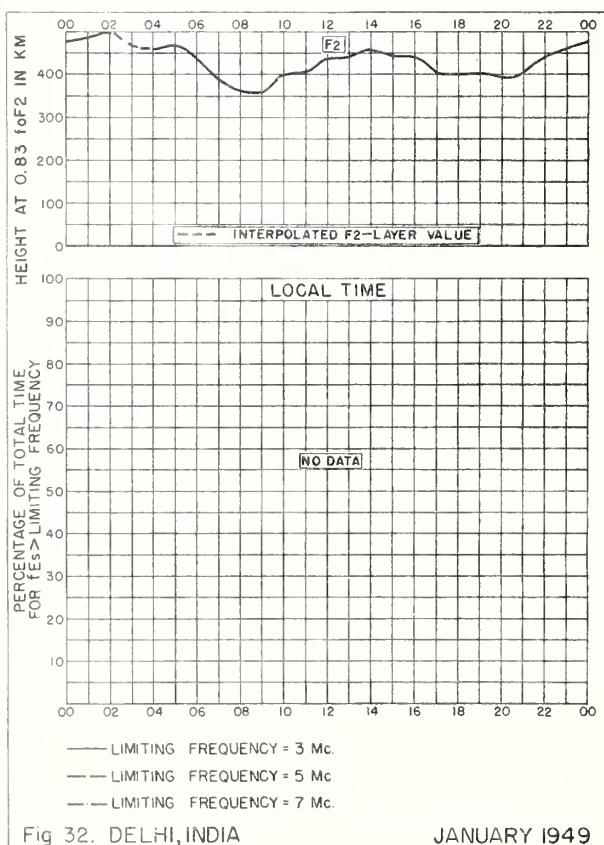


Fig. 32. DELHI, INDIA JANUARY 1949

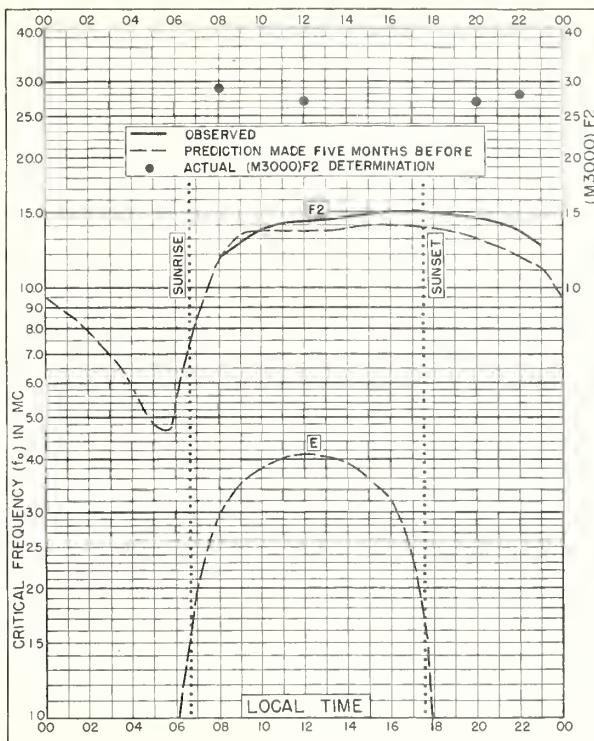


Fig. 33. BOMBAY, INDIA  
19.0°N, 73.0°E

JANUARY 1949

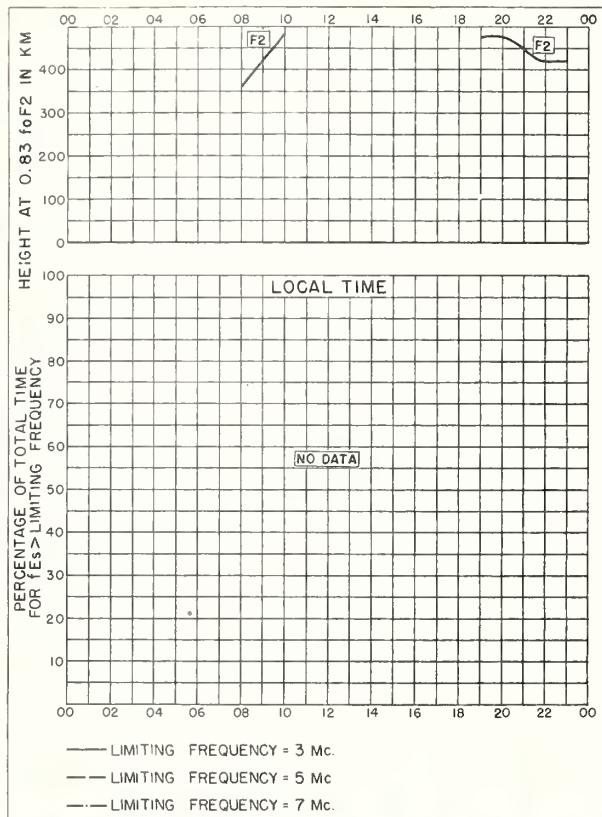


Fig. 34. BOMBAY, INDIA

JANUARY 1949

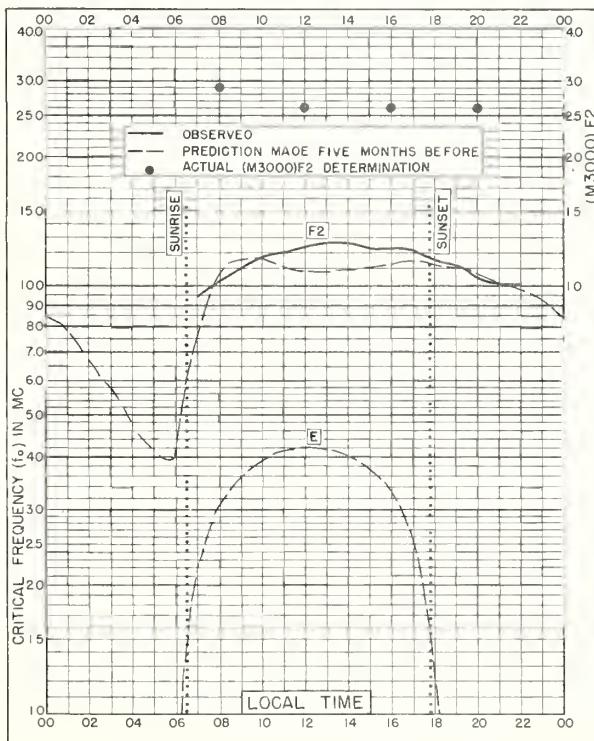


Fig. 35. MADRAS, INDIA  
13.0°N, 80.2°E

JANUARY 1949

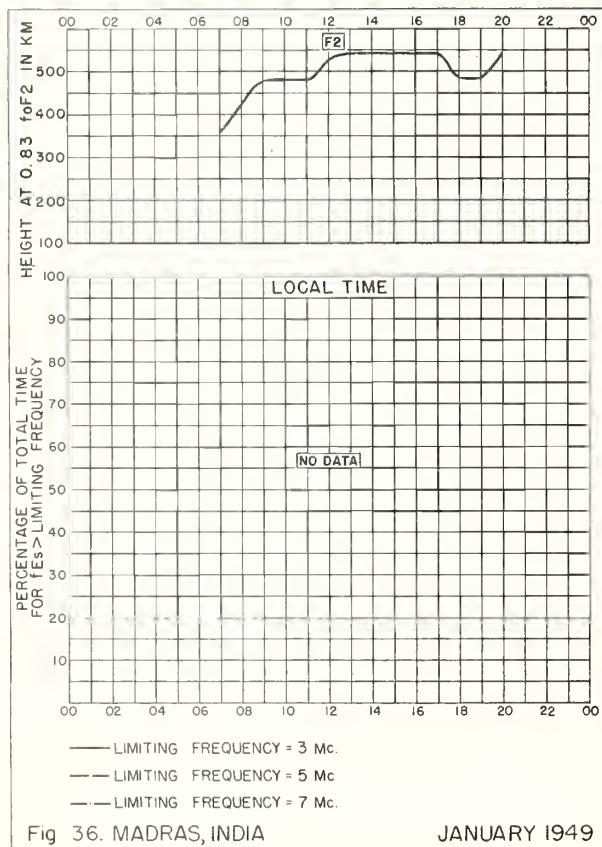


Fig. 36. MADRAS, INDIA

JANUARY 1949

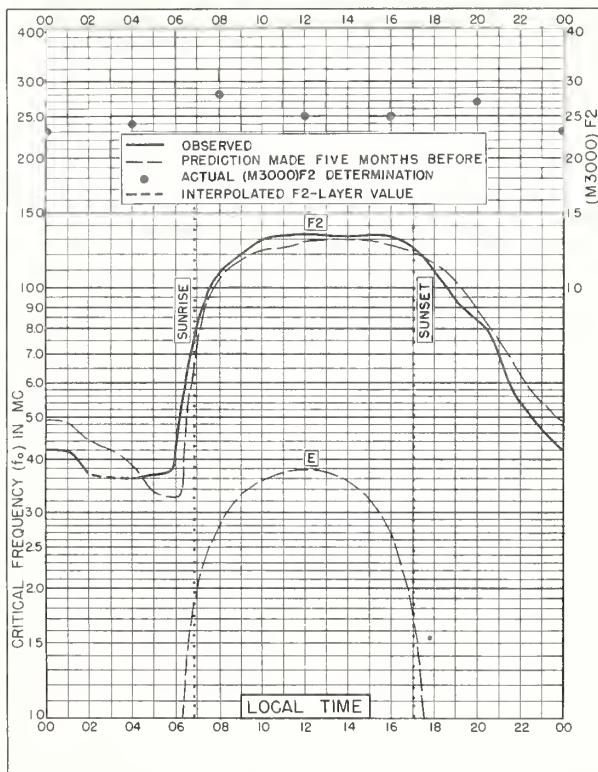


Fig. 37. DELHI, INDIA

28.6°N, 77.1°E

DECEMBER 1948

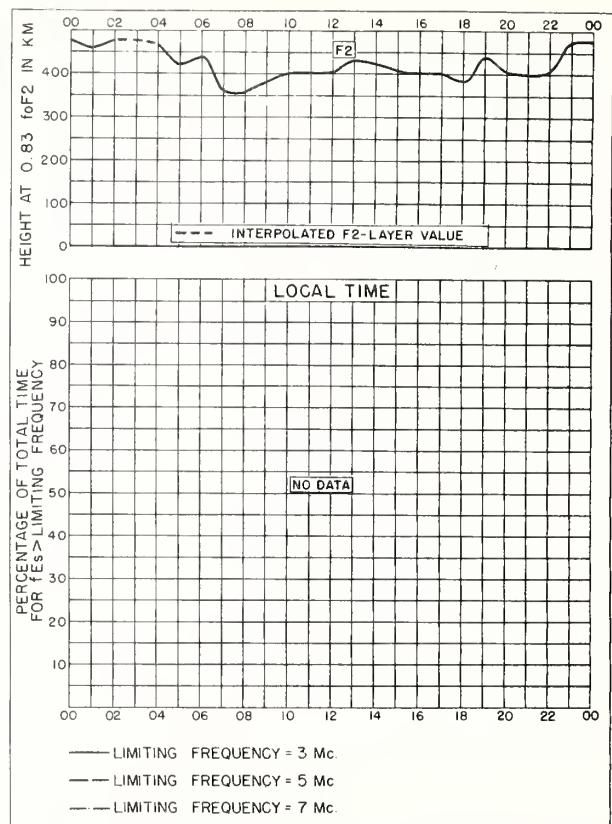


Fig. 38. DELHI, INDIA

DECEMBER 1948

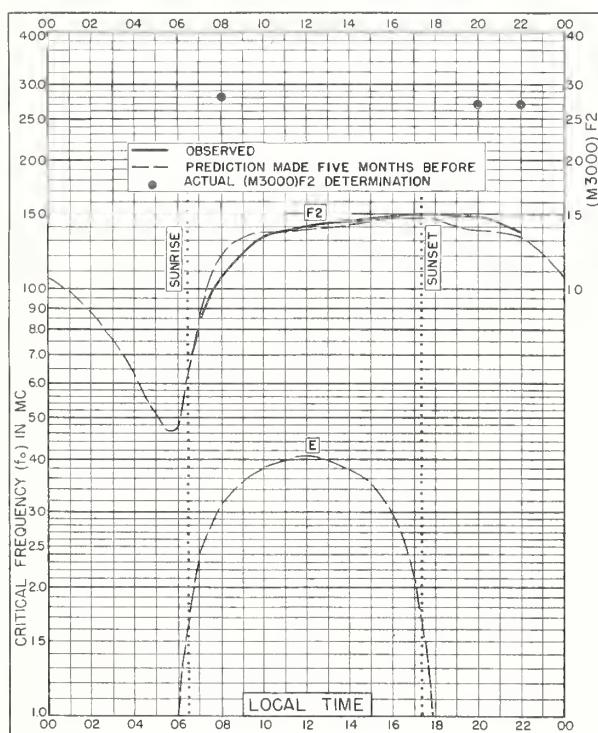


Fig. 39. BOMBAY, INDIA

19.0°N, 73.0°E

DECEMBER 1948

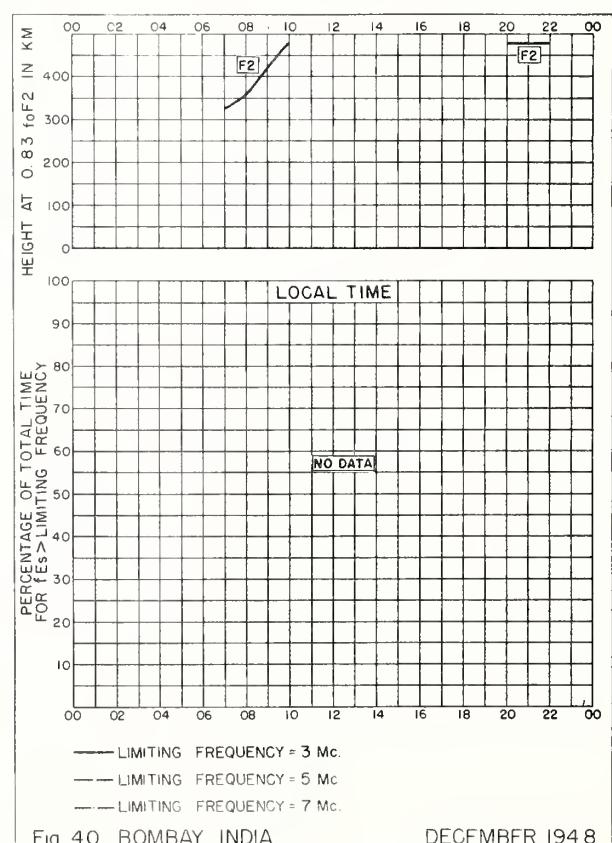


Fig. 40. BOMBAY, INDIA

DECEMBER 1948

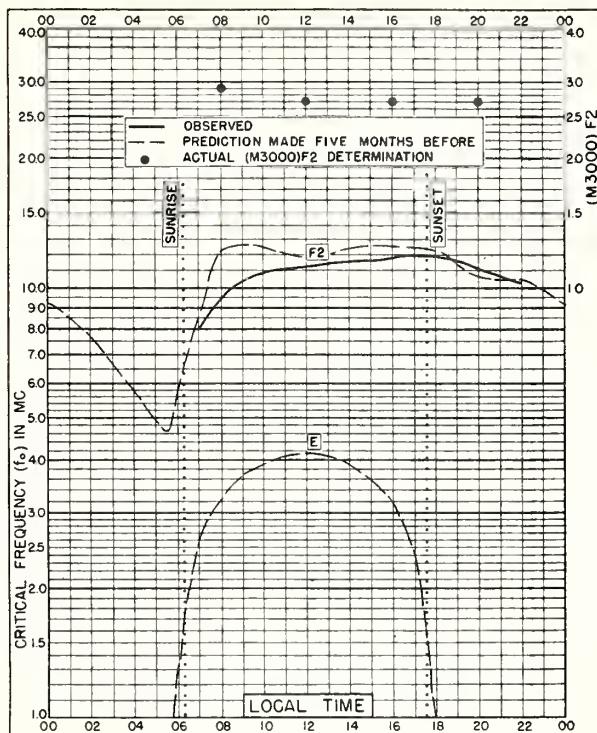


Fig. 41. MADRAS, INDIA

13.0°N, 80.2°E

DECEMBER 1948

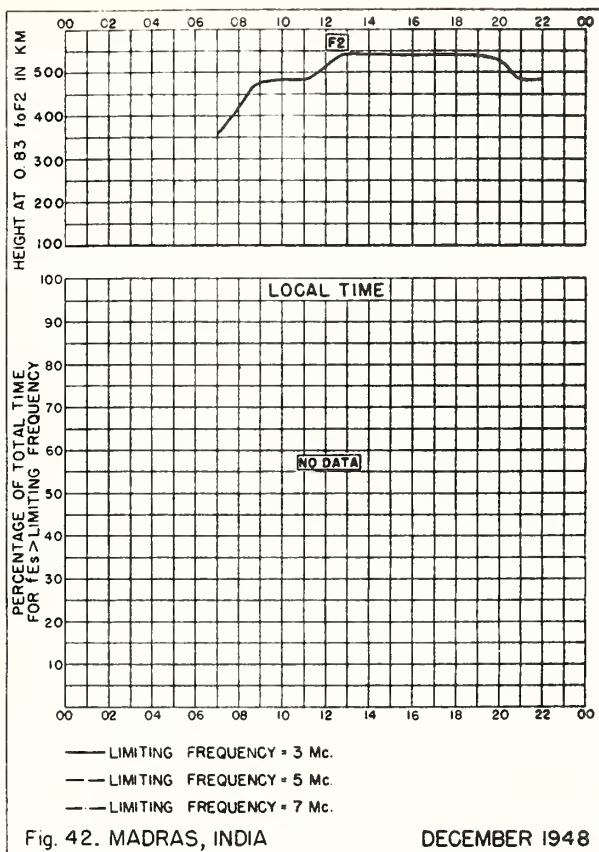


Fig. 42. MADRAS, INDIA

DECEMBER 1948

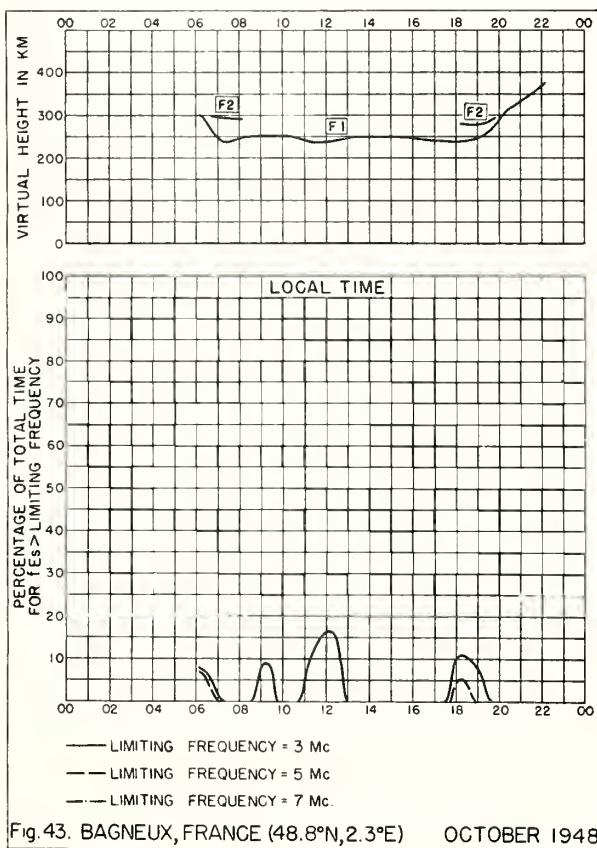


Fig. 43. BAGNEUX, FRANCE (48.8°N, 2.3°E) OCTOBER 1948

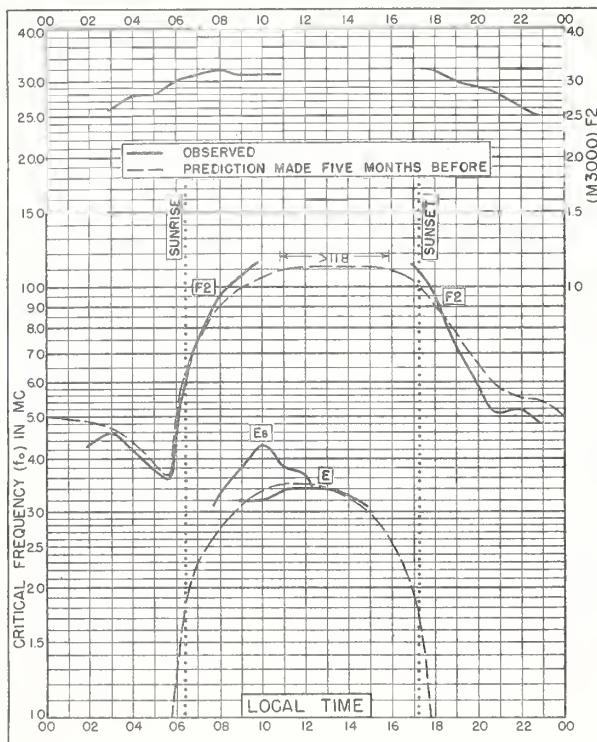


Fig. 44. POITIERS, FRANCE  
46.6°N, 2.0°W OCTOBER 1948

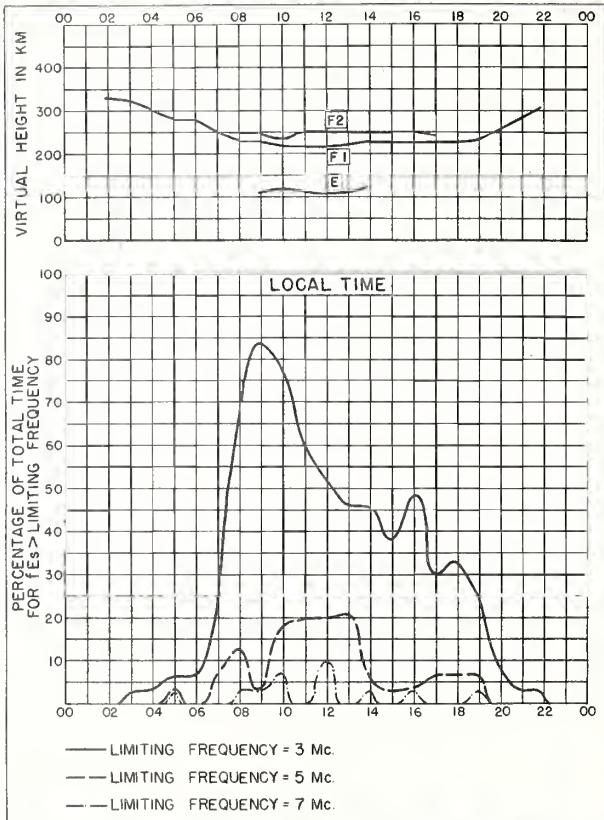


Fig. 45. POITIERS, FRANCE OCTOBER 1948

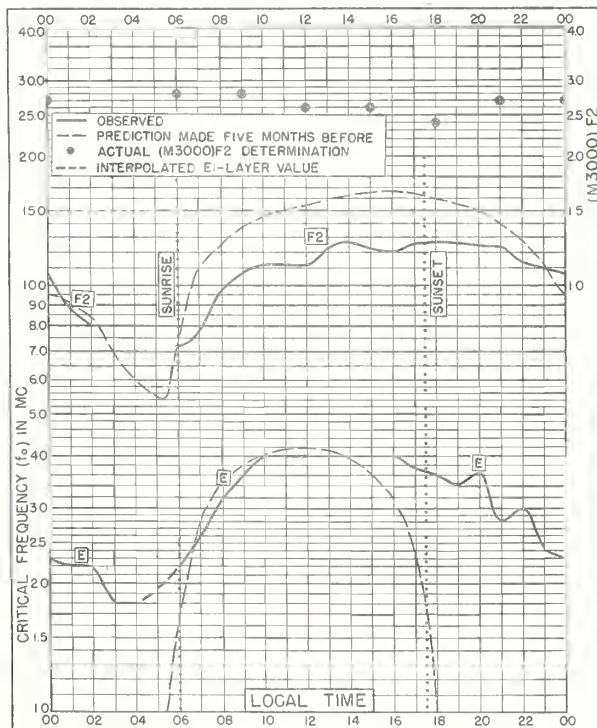


Fig. 46. CALCUTTA, INDIA  
22.6°N, 88.4°E OCTOBER 1948

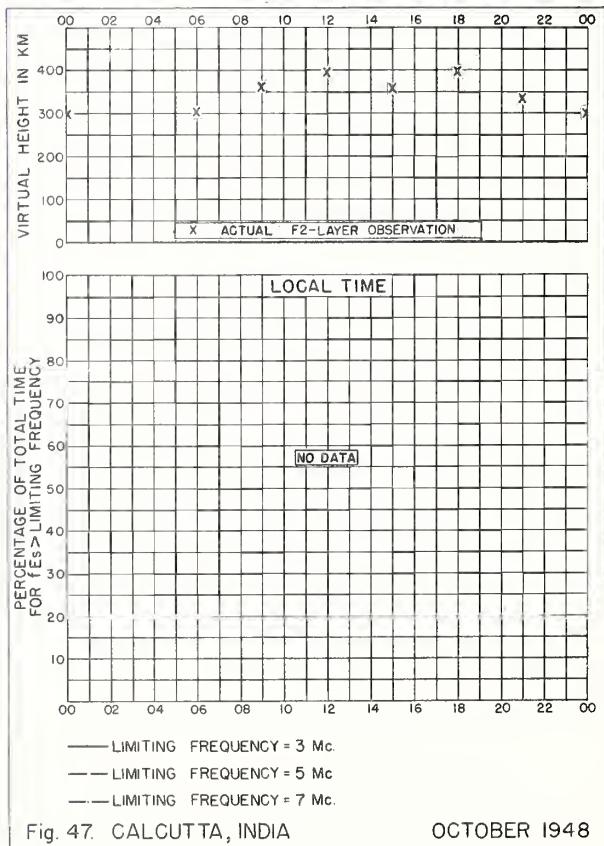
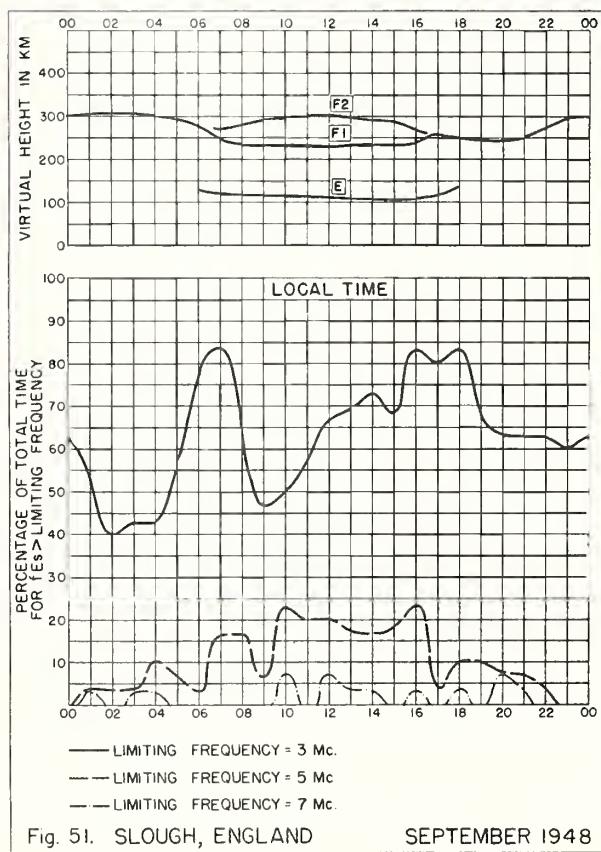
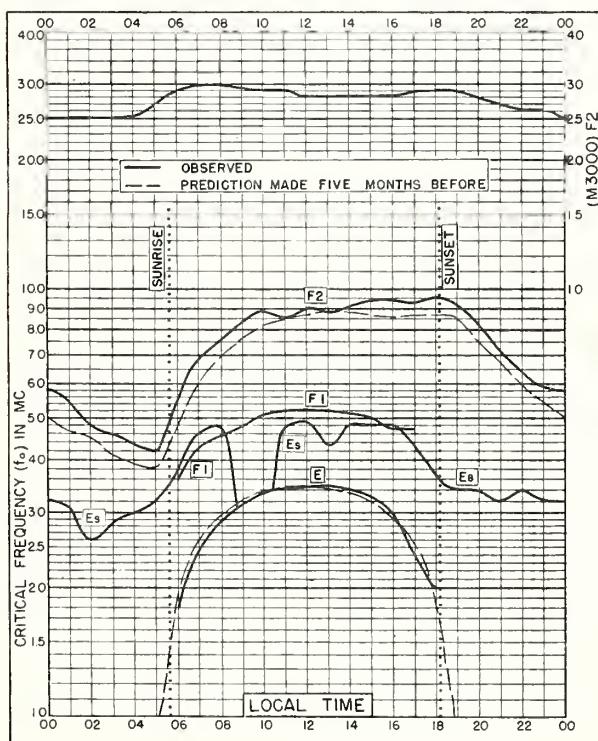
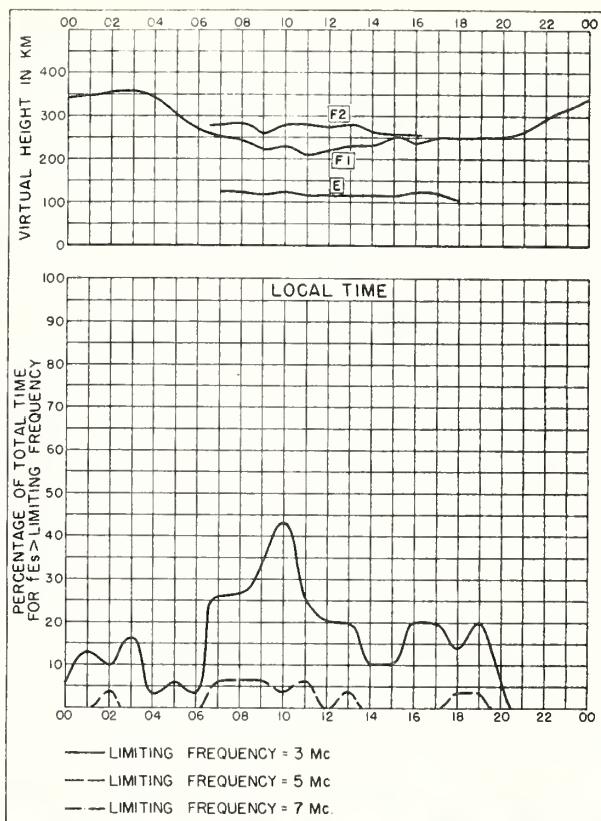
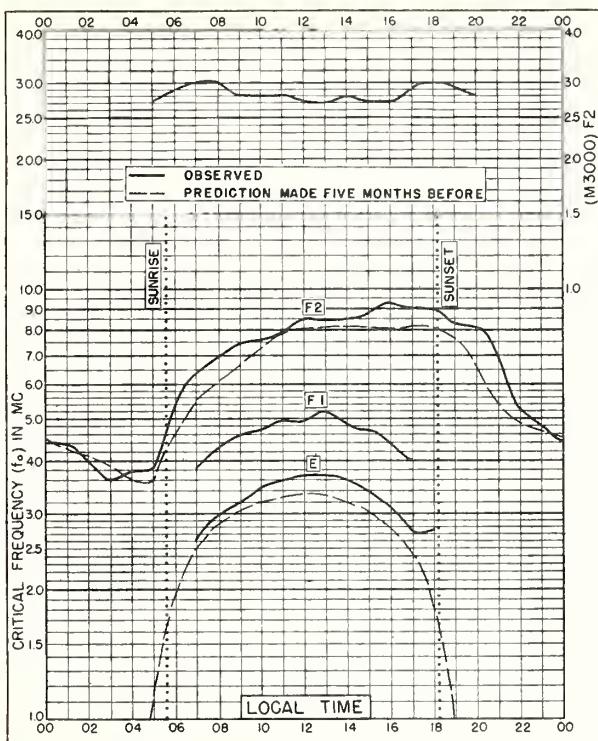
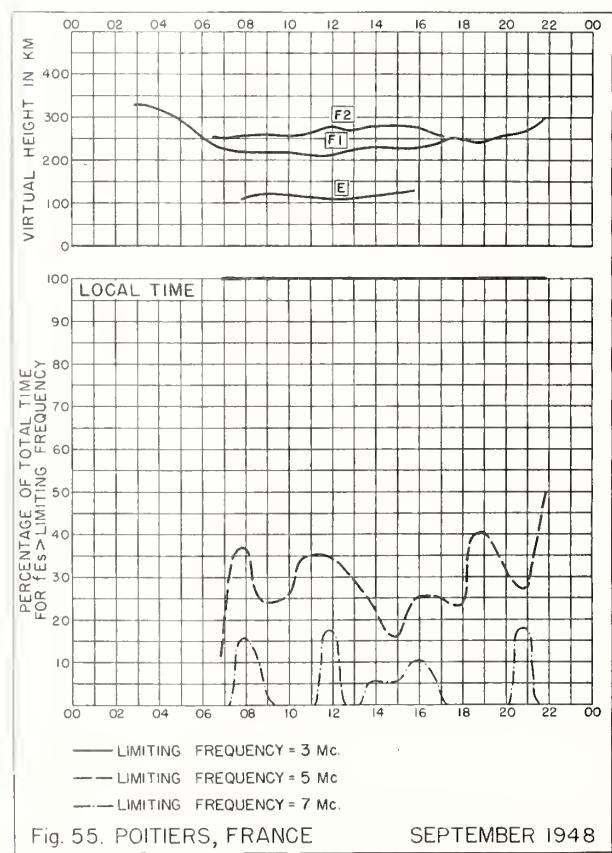
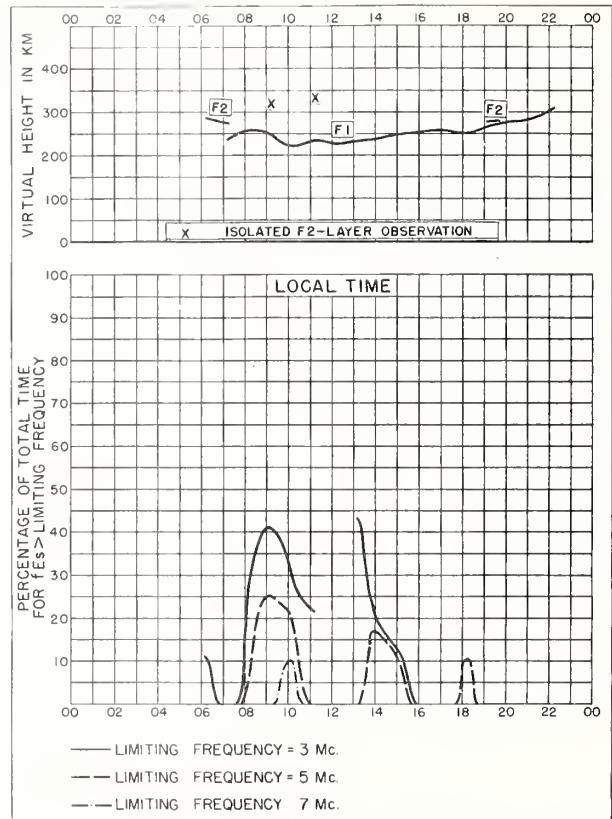
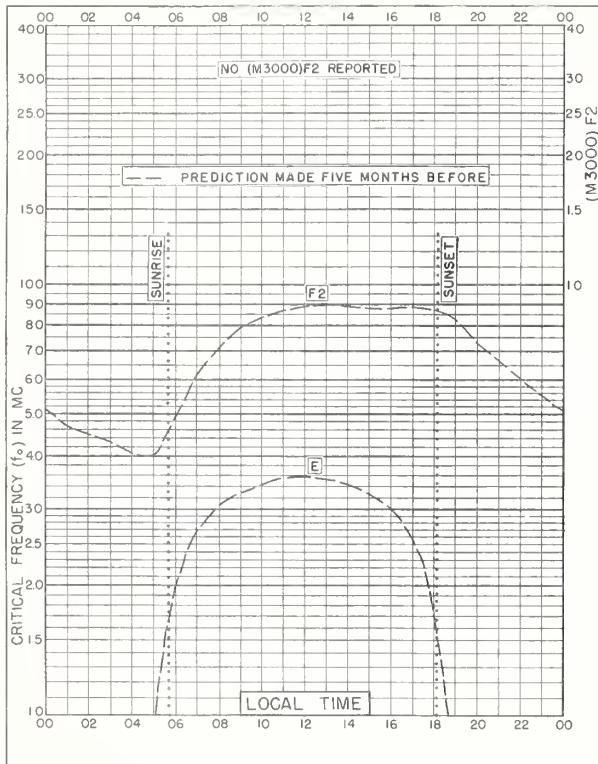
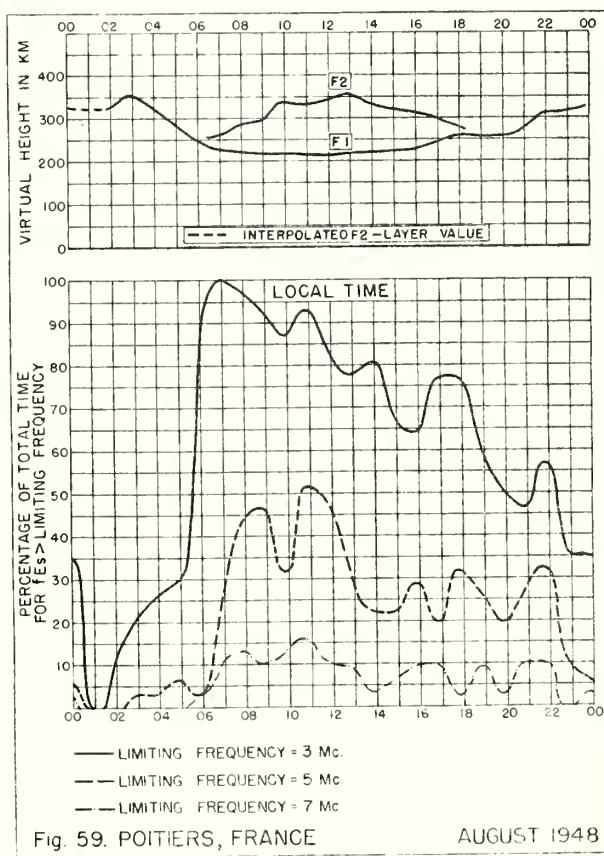
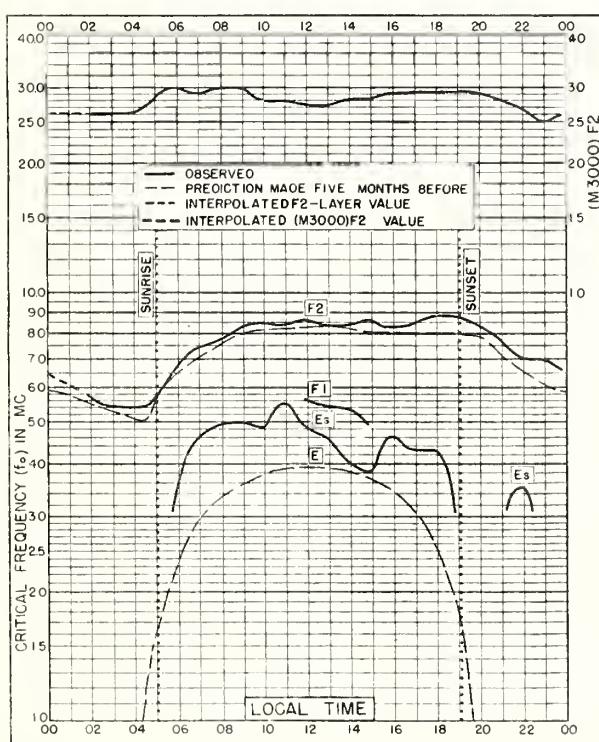
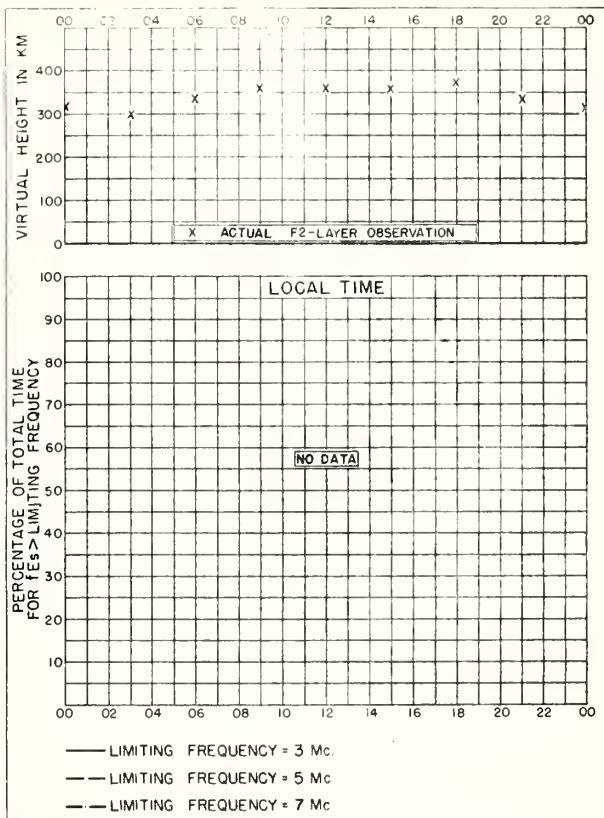
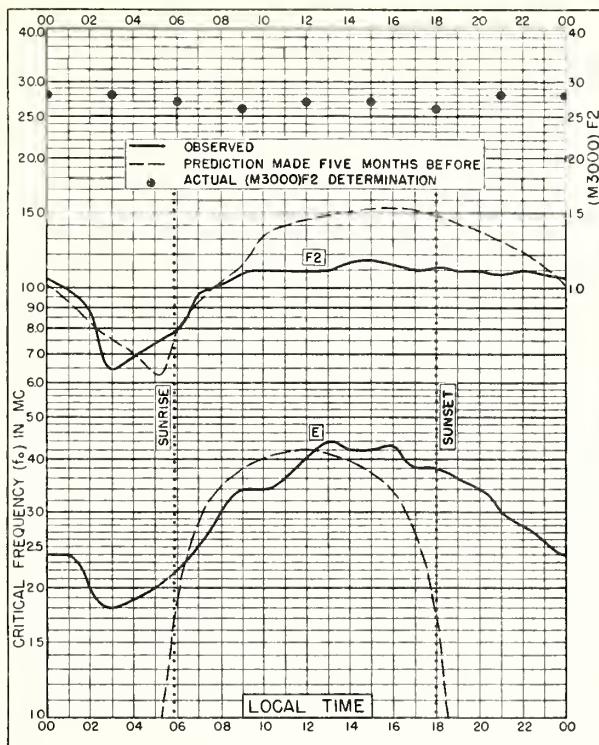
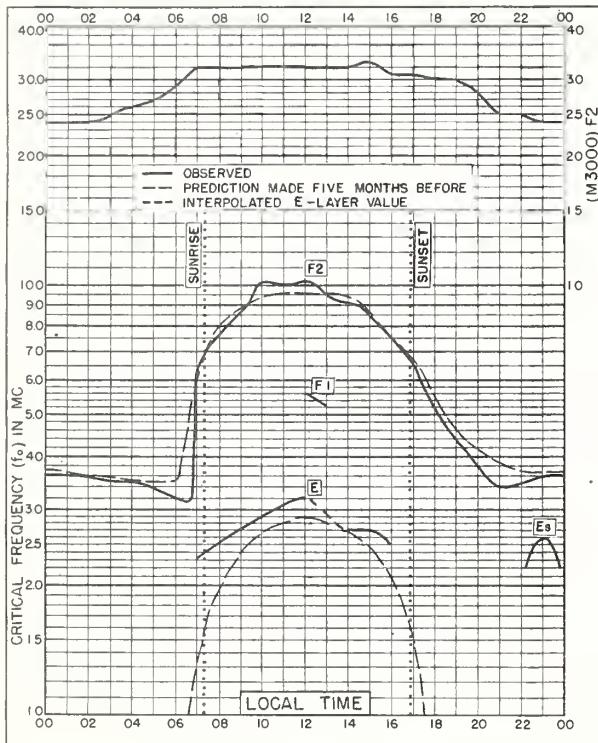


Fig. 47. CALCUTTA, INDIA OCTOBER 1948

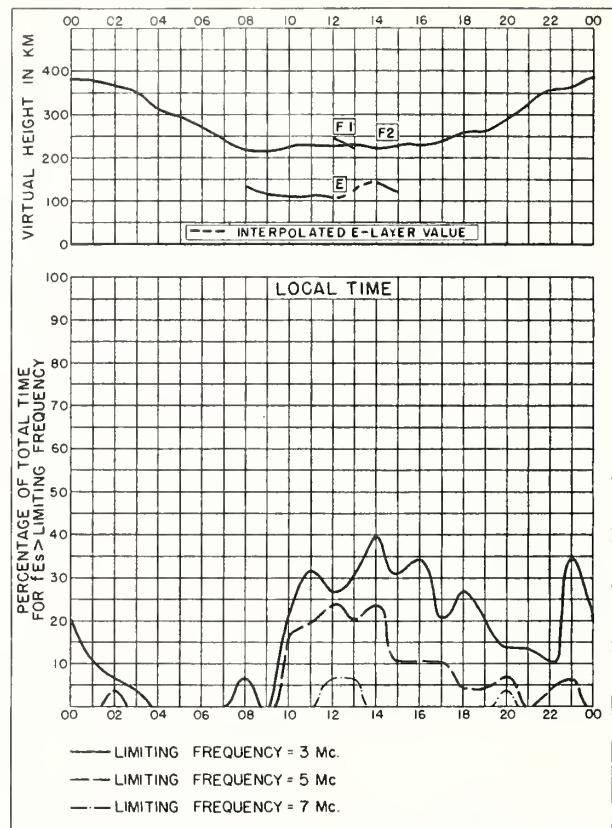








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[A list of CRPL Section Reports is available from the Central Radio Propagation Laboratory upon request]

**Daily:** Radio disturbance warnings, every half hour from broadcast station WWV of the National Bureau of Standards. Telephoned and telegraphed reports of ionospheric, solar, geomagnetic, and radio propagation data.

**Weekly:** CRPL-J. Radio Propagation Forecast (of days most likely to be disturbed during following month).

**Semimonthly:** CRPL-Ja. Semimonthly Frequency Revision Factors for CRPL Basic Radio Propagation Prediction Reports.

**Monthly:** CRPL-D. Basic Radio Propagation Predictions—Three months in advance. (Dept. of the Army, TB 11-499-, monthly supplements to TM 11-499; Dept. of the Navy, DNC-13-1 ( ), monthly supplements to DNC-13-1.)  
CRPL-F. Ionospheric Data.

**Quarterly:**  
\*IRPL-A. Recommended Frequency Bands for Ships and Aircraft in the Atlantic and Pacific.  
\*IRPL-H. Frequency Guide for Operating Personnel.

*Circulars of the National Bureau of Standards:*

NBS Circular 462. Ionospheric Radio Propagation.

NBS Circular 465. Instructions for the Use of Basic Radio Propagation Predictions.

*Reports issued in past:*

IRPL-C61. Report of the International Radio Propagation Conference, 17 April to 5 May 1944.

IRPL-G1 through G12. Correlation of D. F. Errors With Ionospheric Conditions.

IRPL-R. Nonscheduled reports:

- R4. Methods Used by IRPL for the Prediction of Ionosphere Characteristics and Maximum Usable Frequencies.
- R5. Criteria for Ionospheric Storminess.
- R6. Experimental Studies of Ionospheric Propagation as Applied to the Loran System.
- R7. Second Report on Experimental Studies of Ionospheric Propagation as Applied to the Loran System.
- R9. An Automatic Instantaneous Indicator of Skip Distance and MUF.
- R10. A Proposal for the Use of Rockets for the Study of the Ionosphere.
- R11. A Nomographic Method for Both Prediction and Observation Correlation of Ionosphere Characteristics.
- R12. Short Time Variations in Ionospheric Characteristics.
- R14. A Graphical Method for Calculating Ground Reflection Coefficients.
- R15. Predicted Limits for F2-layer Radio Transmission Throughout the Solar Cycle.
- R16. Predicted F2-layer Frequencies Throughout the Solar Cycle, for Summer, Winter, and Equinox Season.
- R17. Japanese Ionospheric Data—1943.
- R18. Comparison of Geomagnetic Records and North Atlantic Radio Propagation Quality Figures—October 1943 Through May 1945.
- R19. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for June.
- R20. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for September.
- R21. Notes on the Preparation of Skip-Distance and MUF Charts for Use by Direction-Finder Stations. (For distances out to 4000 km.)
- R22. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for December.
- R23. Solar-Cycle Data for Correlation with Radio Propagation Phenomena.
- R24. Relations Between Band Width, Pulse Shape and Usefulness of Pulses in the Loran System.
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- R26. The Ionosphere as a Measure of Solar Activity.
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- R28. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for January.
- R30. Disturbance Rating in Values of IRPL Quality-Figure Scale from A. T. & T. Co. Transmission Disturbance Reports to Replace T. D. Figures as Reported.
- R31. North Atlantic Radio Propagation Disturbances, October 1943 Through October 1945.
- R32. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for February.
- R33. Ionospheric Data on File at IRPL.
- R34. The Interpretation of Recorded Values of fEs.
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